ROADS AND STREETS

Design, Construction, Maintenance and Traffic Control

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***See the Road and Street Catalog & Data Book**

In addition to the advertising messages to be found in this issue of Roads and Streets on the pages as indicated above, condensed catalogs of those marked * as well as other specifications and construction data will be found in the Road and Street Catalog and Data Book, the 384 page annual reference guide for the highway industries, published by the Gillette Publishing Co.

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ROADS AND STREETS

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Akron-Canton Road, 2 Miles South of Akron

The 22-Mile Brick Paved Akron-Canton Superhighway

By H. G. SOURS

County Engineer, Summit County, Akron, O.

THE State of Ohio has recently finished the construction of the longest completed superhighway on its state system. The entire distance between Canton and Akron, two of the outstanding industrial cities in the heavily populated northeastern section of Ohio, is 22 miles. It is paved with a brick surface on a heavy concrete base and is 40 ft. wide. The entire improvement conforms to the most modern practice in location, grades, design and construction. It is one of the most heavily traveled roads in the state of Ohio. The section from the city of Canton to North Canton was constructed in 1929; the section from North Canton to the city of Akron, 11.67 miles, has just been completed in record-breaking time. Surveys were started in the Fall of 1930 and in less than one year's time from that date the 12 miles of superhighway, costing nearly $1,000,000 was completed and opened to traffic.

Right-of-Way and Relocation.—The right-of-way was originally 66 ft. wide. On that part of the improvement which is in Stark County, the fact that valuable property and buildings were located along a considerable portion of the road, would have made the widening of the right-of-way a very costly and difficult problem; it was accordingly decided that the road should be corrected in alignment and grade wherever necessary and that the acquiring of additional right-of-way be limited to such places. On that section of the road located in Summit County, widening and relocating was less difficult because the highway went through no densely built-up sections and with a few exceptions the buildings were well back from the right-of-way, accordingly it was decided that the right-of-way be widened to 80 ft., all of which was taken off of one side rather than being equally divided on both sides. In addition to this, all curves were reduced to 5 degrees and under and an entirely new location of approximately 4,000 lin. ft. was made, which completely eliminated a series of sharp curves and steep grades. Sections of the existing 16-ft. pavement were left in place but wherever it was necessary to remove sections of the old pavement in order to

Base Construction Showing Mixer and Trucks on Opposite Side from Section Being Poured

obtain proper alignment and grade, there was no hesitancy in removing the old pavement. Special attention was given to reducing vertical curves to such an extent that safe sight distances were obtained. The right-of-way and damages, which included the moving of a few buildings, amounted to slightly over $30,000; this included widening to 80 ft. and relocation above-mentioned in Summit County and such additional right-of-way as was necessary for improvement of the alignment in Stark County.

Design Features.—The pavement is 40 ft. over all width consisting of a bituminous filled wire cut vertical fiber lug brick laid on 1-in. granulated slag and sand cushion on a concrete base. The concrete base is 8 in. thick on all of the widened and relocated sections and 6 in. thick over the old pavement where it was left in place. A layer of granulated slag was spread and rolled over such sections of the old pavement as were left in place so as to build up the crown and to separate the old and new pavements. The 6 in. base was then placed over the rolled granulated slag course. Three longitudinal contraction joints were spaced at 10-ft. intervals, the joint in the center being the entire depth of the base on account of its being a construction joint, and at the quarter points were of the weakened plane type 2 in. in depth. Transverse contraction joints were installed at 40 ft. intervals 2 in. in depth, and on one section of the road a 2-in. open expansion joint was placed at 240-ft. intervals, and on another section a 1-in. open expansion joint was placed at 120-ft. intervals. All contraction joints, both longitudinal and transverse were doweled. One end of the contraction joint dowels was covered with a cardboard sleeve which extended slightly across the joint; this type of sleeve was favored due to the fact that when the joint opens the cardboard will break at the joint and will not tend to hold the ends of the slab together in case the sleeve might have been shoved somewhat out of line after its installation. All con-

Blowing Joints Clean with Compressed Air

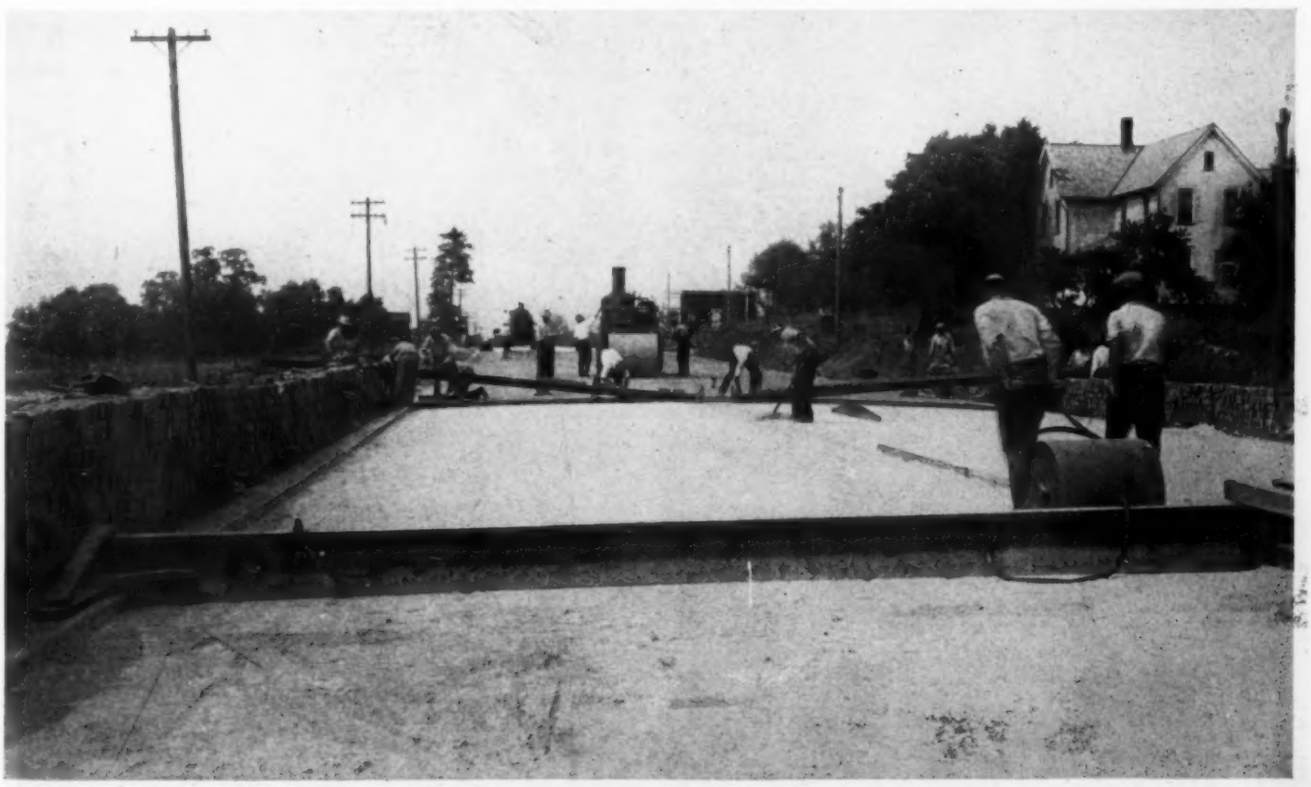
Method of Covering Open Expansion Joints. Note Metal Plate in Place Being Covered and Sealed with Strip of Burlap

traction joints both longitudinal and transverse were filled with bituminous material and covered with a strip of burlap which was then sealed in place by application of additional bituminous material both along the edges and on the center of the strip of burlap. Expansion joints were filled to a depth of approximately 1 in. from the bottom, a galvanized metal plate was then laid over the open joint which was then covered with a 12-in. strip of burlap and sealed in place by mopping both edges of the burlap with bituminous material. This held the plate in place and at the same time permitted movement of the ends of the slab underneath it. The purpose of designing the base as described, was to control contraction cracks which are bound to occur and to prevent the filtering of the cushion material into such cracks by sealing and covering them before the top was placed. It was necessary that the expansion joints remain open so as to prevent the surface being pushed up by any expansion joint material which might be used to fill them and at the same time to prevent the cushion material from filtering in by the use of the cover plate. On the section in Stark County a raised curb, 7 in. x 18 in., was constructed together with the necessary storm sewers, inlets and manholes. A 12-in. flush header curb was constructed in the centerline of the pavement providing a permanent traffic line and separating the pavement in two sections for construction. On the Summit County Section where right-of-way was available, a flush or header curb 12 in. wide was constructed with a 10-ft. shoulder on each side. It is intended that parking will be prohibited on the pavement as the shoulder width is ample for that purpose.

Construction Methods.—The grading was handled entirely with gas shovels, trucks, tractors and crawler wagons. All fills were thoroughly rolled in layers and at such points where the new pavement was to extend beyond the width of the shoulder of the old roadway,

10-Ton Tandem Roller on Granulated Slag Cushion and on Brick; Also Bumpometer Used in Checking Surface; Filling Operations in Distance

the shoulder was cut down its full depth and then rebuilt up to the required subgrade in layers. The base was constructed in two 20-ft. sections using a screed finishing machine to strike off and finish the concrete. The joints were made by installing 2-in. metal bars from a bridge, the final belting being done after the metal joint bars had been placed. These bars were then pulled after the concrete had set sufficiently so as to prevent slumping of the joint. The curb was placed immediately behind the placing of the concrete in the base using forms which were easily set in place on top of the base form and the base itself. Limestone aggregate and additional cement was used in the curb batches which were dumped into a box along side the pavement and wheeled back to the curbs in wheelbarrows. No trucking was done over the subgrade after the forms had been set so that it was possible to do all fine grading and to set all dowel steel considerable distance ahead, the mixers and trucks being kept on the other half of



Preparation of Bed and Dropping of Brick. Note Straight Edge Lying on Cushion Which Is Used for Checking. Brick Are Being Dropped by Two Droppers from Rolls on Each Side

Filling the Brick. Note Truck Tank and Squeegee Buggies; Also One-half of Pavement Rolled and Unfilled, the Other Half Filled and Cover Materials Spread in Distance

the road. All proportioning of materials was done at central batching plants and both fine and coarse aggregates were measured by weight. Three concrete mixers working two 8-hr. shifts each day did the entire job. The surface of the concrete and curbs was covered with wet burlap immediately after the finishing which remained in place until the following day when it was removed and covered with straw which was kept wet for a period of six days. Careful attention was given to providing sufficient curing.

Before any cushion material was spread, all joints were thoroughly cleaned and blown out with an air compressor. All contraction joints were then filled with hot asphalt poured from a can with a long pinched spout. Immediately following the pouring of the joints a strip of burlap was placed over the joint and sealed in place with more asphalt. The expansion joints were sealed about 1 in. in the bottom and then covered with the 8-in. metal strip and burlap sealed in place as described earlier in this article. The cushion material was then spread and struck off with templets covering one-half of the width of the road. On the section where granulated slag was used as a cushion a 10-ton tandem roller was used to thoroughly compact the material; where sand formed the cushion material a light roller was used. The cushion was then again screeded and rolled with a hand roller after which it was straight edged before the laying of any brick. This precaution proved itself to be one of the most valuable features of the construction in attaining smoothness of surface. It was possible by straight edging the bed to practically eliminate all variations before the brick were laid and rolled with the result that the amount of brick required to be taken up and relaid on account of roughness, was very small. The brick were dropped from two sets of rolls being fed from each end, two droppers working on each gang. Where granulated slag was used as a cushion material, a 10-ton tandem roller was used to roll the brick; excellent results were obtained with practically no brick being broken and a very firm and smooth surface resulting. A 6-ton roller was used on the section where sand cushion was used. The sand would not permit the use of as heavy a roller as the granulated slag due to the fact that it is not a compressible material which would become firm to the extent that the slag would. After the brick had been laid and culled, a bumpometer was run over the surface to check it for smoothness and all rough spots were immediately taken

Akron-Canton Road Near County Line. Note Raised Curbs and 12-In. Flush Curb in Center of Pavement

up, corrected and relaid. There was, however, as explained above, very little of this work necessary. Asphalt filler was then applied by the use of squeegee buggies; as a general rule two applications were sufficient, but in some cases a light third one was required. The filler was shipped in tank cars and transported to the job in truck tanks equipped with heaters capable of bringing the material to the proper temperature for application. The filled surface was immediately covered with screenings or fine chips which was then rolled into the surface making it skid proof.

Progress.—Surveys were started late in the 1930 season; they were completed, plans and estimates finished, hearings for the acquiring of right-of-way and for settling of damage claims were held; all claims disposed of and right-of-way acquired and all legislation necessary for financing carried out so that the job was sold April 7th, 1931. Grading was started on April 20th, 1931. The concrete base was started June 15th, 1931, and was completed Aug. 25th, 1931; three mixers working continually two 8-hr. shifts from 4 A. M. to 12 noon and 12 noon to 8 P. M. Out of this time approximately 15 days were lost due to Sundays and holidays and weather conditions. Brick laying was started July 10th, 1931, and completed Sept. 9th, 1931, four 8-hr. shifts being employed on this work. This was accomplished by working extra gangs rather than two full 8-hr. shifts at the same point in one day, due to the fact that the daylight hours became less during the latter part of the season. The maximum 8-hr. day's run for one gang amounted to 2,533 sq. yd.; this was an exceptional day, however, and the average was considerably under that. All brick had been laid and the road opened to traffic its entire length Sept. 9th, 1931, approximately six months after grading had been started. The trimming of the shoulders and the completion of guard rail and incidental construction brought everything to completion Sept. 25th, 1931.

Costs.—The total contracts for the 11.67 miles recently completed amount to $998,435.91, including grading, paving, structures, storm sewers and all items incident to the completed job. Eight-in. concrete base, 1:7½ mix was bid from $1.20 to $1.28 per sq. yd. in place. Six-in. base was bid at $1.08 per sq. yd.; 3-in. brick were bid at $1.38 per sq. yd. furnished and laid including cushion and filler and 3½-in. brick at $1.57 in place including cushion and filler. Excavation unclassified was bid at 25 ct. per cubic yard. One of the interesting features in analyzing the unit prices is the fact that the difference in the price of 6 and 8-in. base amounted to about 20 ct., which was approximately equivalent to the cost of the granulated slag necessary to place over the old pavement for the purpose of building up the crown. It can readily be seen from these figures that all of the old pavement might have been replaced with new 8-in. base at no increase in cost; this fact is ample proof that there should be no hesitancy in destroying sections of existing pavement in order to obtain proper alignment and grade.

Results.—While the Akron-Canton Road for several years has been considered to be the most heavily traveled in both counties, considerable traffic had been avoiding it, following other routes so that they might not be caught in congestion on a narrow road with poor alignment and bad grades. Since the new highway has been opened its entire length there has been a marked decrease in traffic on the other routes mentioned and a noted increase on the new highway. Its riding qualities are excellent, the width, alignment and grades are such that high speeds can be driven with comparative safety. A careful check on one section of the road over four miles in length on which profilometer readings were taken on each of the four lanes, or a total distance of over 16 miles, showed only four variations over the allowable limit of ⅜ in. in 10 ft.

Financing.—The job was financed by the Federal Government, using both emergency and regular federal funds, the state highway department, using gasoline tax proceeds and by Stark and Summit Counties from the issuance of bonds.

O. W. Merrill is Director of Highways of Ohio, H. P. Chapman, Chief Engineer of Construction, and Elmer Hilty, Engineer of Construction. The division engineer of the district is C. E. Wild and the resident engineers are Atlee Wise of Stark County and H. G. Sours of Summit County. The contractors are the Cleveland Trinidad Paving Co., Cleveland, O.

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Annual Meeting of National Paving Brick Manufacturers' Association to Be at Chicago

The 26th annual meeting of the National Paving Brick Association will be held at Chicago, Ill., Feb. 10-11-12, 1932.

The program for the last two days will include papers and discussions of the latest practices in the design and construction of streets and highways, particularly the vitrified brick type. These sessions will be open to the general public and any one interested in street and highway development is invited to attend.

The program, now under preparation, will be presented by prominent engineers, contractors and paving authorities. It will include descriptions of recently constructed brick highways, streets and boulevards; efficient management of brick paving contracts; and discussions of the application of highway research to modern brick pavement design, including filler and cushion construction. The use of brick for resurfacing and replacement work will be featured. One session will be devoted to a field inspection of one of the recently brick resurfacing improvements near Chicago.

The annual banquet will be held Thursday night, Feb. 11, and business conferences will be held on the first day of the meeting.

George F. Schlesinger, formerly State Highway Director of Ohio, is Chief Engineer and Managing Director of the National Paving Brick Association.

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GAS SALES PROVIDE FUNDS FOR ROAD BUILDING IN ARGENTINA.—In February, 1931, the various gasoline and oil companies in Argentina agreed to collect a surcharge of about 3 ct. (U. S. currency) per gallon on gasoline sold. The Argentine Government was to receive the proceeds for road construction purposes, and it was estimated that the collections for 1931 would total about $5,400,000. A decrease in the use of motor vehicles, due to the present economic depression, caused the Minister of Public Works to reduce this estimate to approximately $5,100,000. The minister has already authorized road construction and repairs to cost about $4,849,000, to be derived from the gasoline surcharge fund.

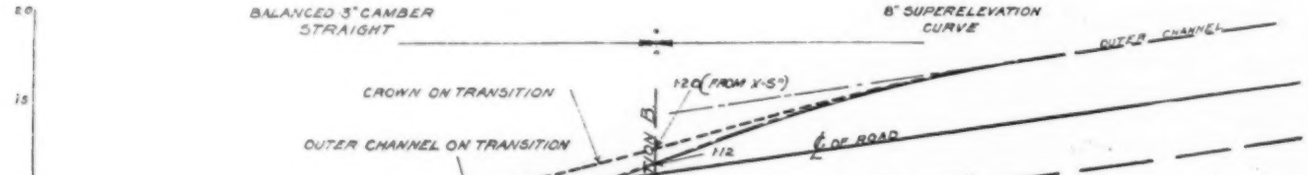
A Simple Method of Setting Out Super-Elevation

By J. J. LEEMING
Resident Engineer, Oxford Northern By-Pass County Section, England

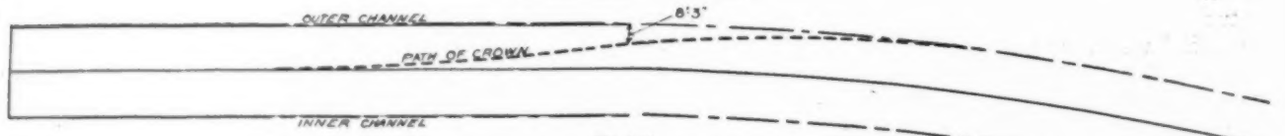
THE practice of super-elevating sharp curves on roads has become so universal that a simple way of obtaining the levels to be set out on the work is very necessary. The method described in this article is a simple graphical one, taking only a few minutes to draw, and needing no more than a sheet of squared paper, though it is advisable to have a box of railway curves in addition to the usual instruments and colored inks. An additional advantage is that if the road is to be constructed of concrete it is possible to design the screed boards to give the correct change from balanced to super-elevated road, no matter whether they are to be square or skew across the road, or longitudinal with it.

The basis of the method is a longitudinal section plotted to a very exaggerated vertical scale. This, of course, inverts the proverb and turns molehills into mountains, but the vertical scale must be large enough to show the difference in level between crown and channels clearly, and to enable the levels to be read off to the nearest hundredth of a foot, and the horizontal scale must be small enough to keep the size of the drawing down to manageable proportions. Some practice is necessary before this exaggerated scale can be used with confidence, as it is hard to realize that what looks like a precipice is really a gentle gradient on the road, but it can be taken with assurance that if a curve looks right on the section it will certainly do so in the finished work.

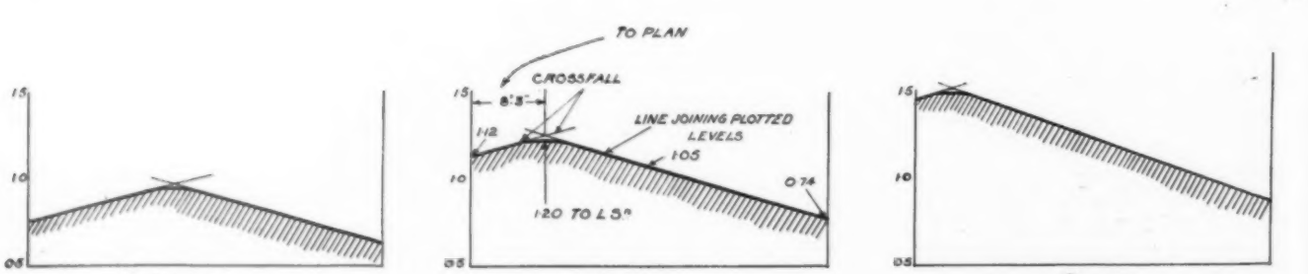
On this section are plotted the levels of the center of the road, and to this the line of the channels is drawn parallel, and to the appropriate camber on the balanced and the super-elevated portions. Then these channel lines are joined to each other, over the transition by easy curves so as to obtain the most pleasing possible lines to the finished channels. Thus it will be seen that the channel lines are used as the determining factors, and not, as in the usual methods, the



LONGITUDINAL SECTION



PLAN



A AT 12·5 B AT 17·5 C AT 22·5

CROSS SECTIONS

Fig. 1—Arbitrary Case Taken as an Illustration of the Method

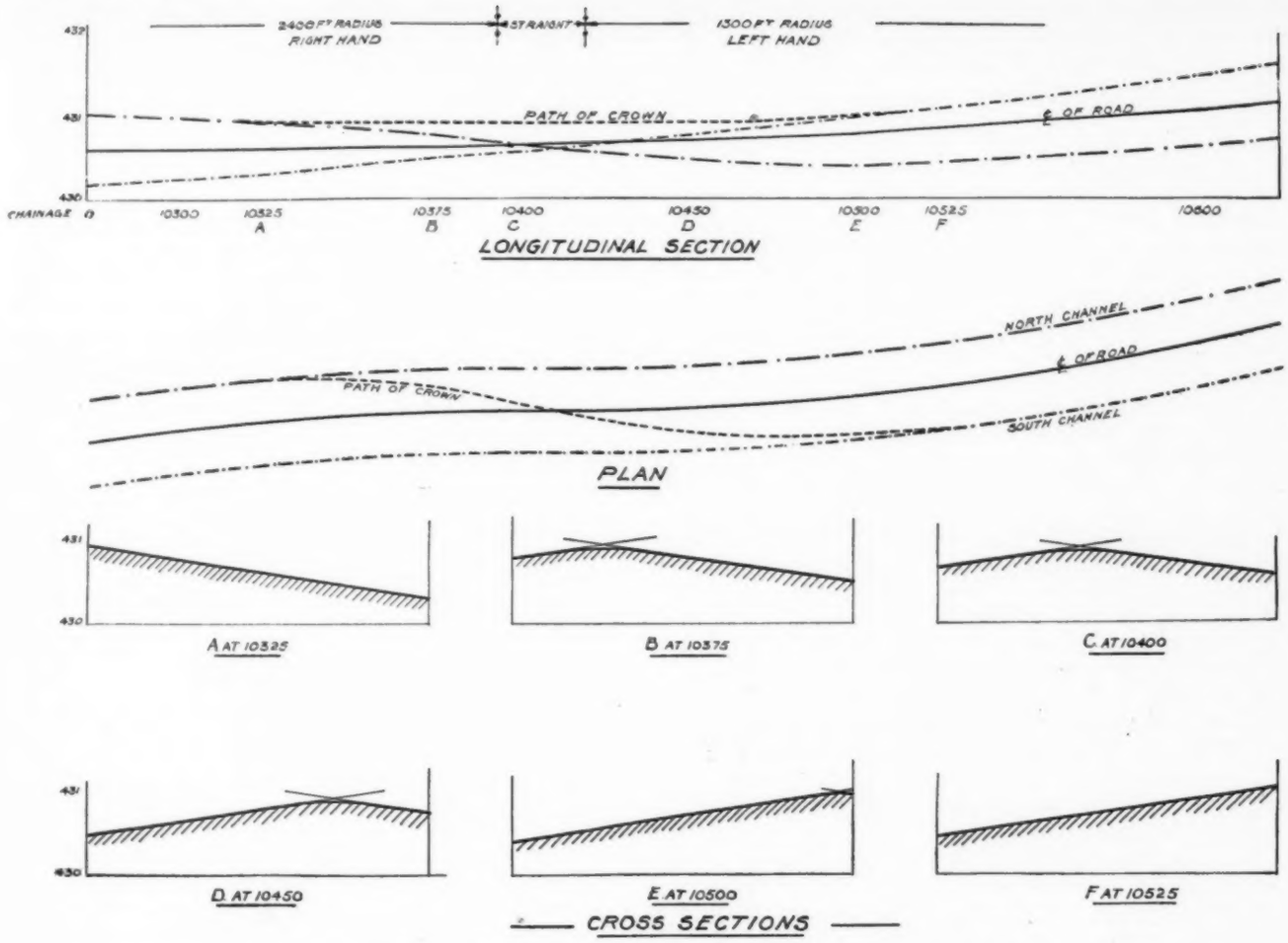


Fig. 2—Actual Example of Transition of Super-Elevation on a Reversed Curve

crown or the general road surface. The reason for this is that in the finished work the curbs are the most conspicuous feature, and if their line is unsightly no amount of scientific accuracy can save the general appearance of the road. The curb lines are, of course, dictated by those of the channels.

The result of thus using the channel lines is that the crown, when plotted in plan, appears to cross in a very abrupt and sometimes unsightly manner, but it must be remembered that it is almost impossible to point to the position of the crown on the road with any accuracy, so that its actual theoretical path in plan is immaterial. If the curve is compound it is possible and frequently advisable to graduate the amount of super-elevation given, for example, from 6 in. at the beginning of the curve to 8 in. on the sharpest part.

Procedure.—Figure 1 is an arbitrary case taken as an illustration of the method. It must not be taken as representing the best practice, as it would not be good work to start a curve sufficiently sharp to require 8 in. of super-elevation directly off the straight without some attempt at transition. In fact, the example is one of unfavorable conditions.

Fig. 2 is of an actual example of transition of super-elevation on a reversed curve, and is taken from the reconstruction of the Oxford-Cheltenham Road now in progress under the county surveyor of Oxfordshire, Mr. G. T. Bennett, the writer then being resident engineer.

1. Refer to Fig. 1, which is for a 20-ft. road with 3 in. of camber on the straight and 8 in. of super-elevation on the curve.

Plot a longitudinal section of the center line of the new road disregarding super-elevation. In the example this is taken as a straight gradient. Plot on this the position of the tangent point, or tangent points, if the curve is multiple or has a transition curve. On the drawing this is shown as a full line.

2. On this section plot the channel levels. On the balanced part (the straight) this will be one line parallel to, and the amount of the camber (3) in. in this case), below the center line. This is also shown as a full line. On the curve, plot the outer channel 4 in. above and the inner 4 in. below the center line. These are shown as a chain dotted and a dash line respectively.

3. Decide on the length of transition. This, of course, depends on circumstances, but in a case such as is in the drawing, when room is available, it is best made about 200 ft., and the tangent point should be about half-way in this length. Then, starting at the beginning of transition, join the channel section on the balanced part to each of the two channels on the super-elevation with as easy a curve as possible meeting the super-elevated sections at the end of transition. Should the type of road construction be a narrow concrete haunching, or curbs laid before the center of the road is made up, this will be all that is necessary, and the levels to set out can be read off the appropriate sections.

If, however, wide haunching or a concrete road is used, or for any reason it is desired to know the levels of the crown of the road, cross-sections and a plan

must be plotted. To plot a cross-section at any point, read off the levels of the curbs and center line of the road, and plot them on the section. Join the levels found for the inner channel and the center line with a straight line, and from the level found for the outer channel draw up a straight line to a desired crossfall, which would usually be taken as the same as on a balanced road, in this case 3 in. in 10 ft. Round off the summit so found. This gives the desired cross-section, and also the level of the new crown and its position relative to the sides of the road. Plot a sufficient number of these cross-sections, and then from them the path of the crown can be transferred to the longitudinal section and plan. These are shown in the drawing as a dotted line.

General Notes.—The scales used by the writer are 25 ft. to the inch horizontally, and 1 ft. to the inch vertically, but any scales desired may be used, provided that the vertical scale is large enough to enable the second decimal place of the foot to be read off. The 1-in. scale enables this to be done with enough accuracy for most purposes, but if screed boards are to be designed it is advisable to double the vertical scale, and use 2-in. to the foot, which gives greater accuracy and is clearer. The best paper to use is graduated in inches and tenths. A ruler graduated for 25 ft. to the inch on one edge and 50 ft. to the inch on the other will be found of great help in reading the sections.

The length of transition must be chosen to suit the circumstances, and it is not a matter of extreme importance. If, for instance, there is only a short tangent between two curves of opposite hand, it must be shortened, especially if both are to be super-elevated. (This was indeed actually done in the case shown in Drawing No. 2.) It will also be seen from the plan that the path of the crown is an ogee curve, and that for all practical purposes only the middle part of the transition is effective, so that the transition is really shorter than it appears to be at first sight. Unless the curve has a fairly sharp transition curve, the tangent point of the main curve should be about half-way in the transition of a super-elevation, otherwise there is liable to be a noticeable jerk in a travelling vehicle due to the road being banked where there is not enough curve to justify it. It is remarkable how easy it is to detect this when travelling.

In designing screed boards a cross section may be drawn for any position at which it is desired to have a board. If they are to be square across the road the section can be drawn as described in paragraph 4. If they are to be on the skew, it is simplest to describe the angle of skew as a "lead" of so many feet, rather than as an angle. Say this is to be 4 ft. (about 80 deg.). Then if the screed board cuts one channel at, say 4,000 ft. on the chainage, it will cut the center line at 4,002 and the other curve at 4,004. These levels must be read off the longitudinal sections and plotted on the cross section, allowance being made for the extra length caused by the skew.

The rest of the procedure is as before. The amount of rounding to be given at the crown is a matter for individual choice, but 3 ft. is enough, unless the camber is considerable.

Drawing No. 2 is, as before mentioned, of an actual case, and of a peculiarly unfavorable one. Both curves are very sharp, and owing to a combination of circumstances, no transition was possible, and yet the change of super-elevation from one curve to another has been effected smoothly, and it is hard to tell from a car that the change has occurred. On the 1,300 ft. curve it will be noticed that full super-elevation is reached much sooner in one-half of the road, than the other. This avoids an unsightly kink in the channel line, and does not affect the super-elevation. It will also be noticed that there is only 200 ft. of transition altogether.

Conclusion.—This article is necessarily brief, but the writer trusts that anyone trying the method for himself will be able to supply the blanks. The writer has used it on many curves during the reconstruction of about 20 miles of trunk road and has found it of great value. Its principal characteristics are speed and adaptability to all circumstances. It is also refreshingly free from calculations, and no doubt many people, of whom the writer is one, will regard that as its greatest advantage.

Acknowledgment.—From *The Surveyor* [London].

Commentary on Mr. Leeming's Article

By H. S. Carter

Professor of Civil Engineering, South Dakota State College of Agriculture and Mechanical Arts

Super-elevation transition curve solutions for highway curves as presented by Mr. J. J. Leeming appear to be unique and practical, particularly when applied to the more difficult transition problems. Three characteristics seem essential to any satisfactory transition curve: First, smoothness in riding qualities; second, pleasing appearance; third, simplicity of solution and application. All three of these features are readily possible in Mr. Leeming's method, especially when used by experienced men.

Wholesale use of approximate graphic methods often lead to unsatisfactory results where inexperienced men have to be depended upon for their application.

Super-elevation transition curves for common degree or radius horizontal curves may be standardized as is done in many states. (Illinois is a notable example.) Thus exact computations for transition curves which meet all the characteristics of an ideal transition may be given to inexperienced men for application without much danger of unsatisfactory results. Such data may be supplied in either table or graphic form. Tables usually are more compact.

Cubic spiral transition curves seem highly satisfactory wherever used. This group of curves lend themselves remarkably well to standardization. Most cubic spiral transition curves in use are adoptions of Allen's "Cubic Spiral Easement Curve," or Talbot's "Railway Transition Spiral" which are practically identical.

A form of the spiral curve commonly used is:

A form of the spiral curve commonly used is:

$$e = \left(\frac{d}{d_c}\right)^3 E$$

Where, e = the super-elevation vertical distance between the beginning or end of the transition and the point on the transition under consideration measured from the respective end of the transition towards the mid-point of the transition.

E = one-half of the total super-elevation vertical distance.

d = the distance from the beginning or end of the transition curve which locates the corresponding "e" vertical distance.
d_e = one-half of the length of the transition curve.

The result is a vertical reverse spiral transition curve. The distance "d_e" may be divided into any number of equal parts and constants determined which may be applied with any length of "d_e."

Example: Assume "d_e" divided into four equal parts, then

$$e_1 = (1/4)^3 E = 0.016 E$$
$$e_2 = (2/4)^3 E = 0.125 E$$
$$e_3 = (3/4)^3 E = 0.422 E$$
$$e_4 = E = E$$

Tables or charts may be prepared for various values of "E" multiplied by the respective constants.

Reverse parabolic curves may be used in the same manner.

$$e = \left(\frac{d}{d_e}\right)^2 E$$

As in the example above assume "d_e" divided into four equal parts, then

$$e_1 = (1/4)^2 E = 0.06 E$$
$$e_2 = (2/4)^2 E = 0.25 E$$
$$e_3 = (3/4)^2 E = 0.56 E$$
$$e_4 = E = E$$

Crown position at any "d" cross-section in the transition obviously may be determined by the use of the same set of constants as used for the outside vertical transition curve. One-quarter of the width of the pavement is taken as "E" and the resulting values of "e" are measured in a transverse direction from the centerline of the pavement on the tangent section and from the outside edge of the pavement on the horizontal curve section.

Spiral curve adaptions vary with the application of the super-elevation, extra-widening and location of the normal profile grade around the horizontal curve as is true with any mathematical or graphical solution.

Special vertical transition curve problems usually can be solved more satisfactorily as outlined by Mr. Leeming and in a "refreshingly" simple manner. Mr. Leeming's method seems very commendable.

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Allots $125,000,000 Federal Road Fund for 1933

The Secretary of Agriculture on Oct. 15 apportioned to the states $125,000,000 previously authorized for Federal aid in road construction for the fiscal year ending June 30, 1933. In making the apportionment 2½ per cent was first deducted for administration. The remainder was then apportioned on the basis of area, population and mileage of rural post roads in the various states. From the apportionment to each state there was then deducted one-fifth of the emergency advance funds apportioned last December. The net apportionment available for new projects amounts to $105,875,000.

The new funds are available to the states for immediate obligation of projected construction. The apportionment has been made 2¼ months in advance of the usual date so that the states may get an early start on plans for next season's construction.

The Bureau of Public Roads, through which Federal-aid funds are administered, has indicated a desire to accept policies designed to increase employment and to protect labor. Among the acceptable policies are the fixing of a fair minimum scale for unskilled labor and restrictions giving preference to local unskilled labor and to citizens of the state in which work is being done. If legal, the use of Federal aid will be allowed where labor is employed direct and where such projects can be carried on economically to provide local employment. Restrictions as to hours per day and days per week in order that workers may be continuously employed are also acceptable. The Bureau of Public Roads will not accept the disbarment of a contractor from the award of a contract because he is a non-resident of the state, provided he is the lowest responsible bidder, nor will it accept the limitation of materials to those produced within the state.

Last season Federal-aid road work was greatly accelerated because the regular authorization of $125,000,000 was supplemented by an emergency authorization of a loan of $80,000,000. At the peak of the season more than 155,000 men were engaged on Federal-aid work.

The new apportionment is as follows:

APPORTIONMENT OF FEDERAL AID FOR THE FISCAL YEAR 1933 AVAILABLE OCT. 15, 1931

State	Sum Apportioned	Deduction Account Emergency Advance Funds	Net Apportionment Available for New Projects
Alabama	$2,589,898	$339,729	$2,250,169
Arizona	1,790,177	234,096	1,556,080
Arkansas	2,124,109	277,631	1,846,477
California	4,742,676	621,646	4,121,029
Colorado	2,290,520	301,566	1,988,953
Connecticut	791,500	104,098	687,401
Delaware	609,375	80,000	529,375
Florida	1,654,660	217,287	1,437,372
Georgia	3,168,944	415,599	2,753,344
Idaho	1,532,055	201,607	1,330,448
Illinois	5,156,577	680,023	4,476,553
Indiana	3,108,083	409,185	2,698,897
Iowa	3,223,079	423,273	2,799,805
Kansas	3,327,526	438,460	2,889,065
Kentucky	2,294,955	300,943	1,994,012
Louisiana	1,767,386	229,585	1,537,800
Maine	1,087,328	143,159	944,168
Maryland	1,031,160	135,750	895,409
Massachusetts	1,739,536	228,292	1,511,244
Michigan	3,842,291	504,276	3,338,014
Minnesota	3,426,272	449,998	2,976,273
Mississippi	2,194,388	286,947	1,907,440
Missouri	3,819,780	505,364	3,314,415
Montana	2,564,563	334,386	2,230,177
Nebraska	2,597,647	341,606	2,256,040
Nevada	1,602,681	209,927	1,392,753
New Hampshire	609,375	80,000	529,375
New Jersey	1,685,045	221,561	1,463,483
New Mexico	1,993,001	260,657	1,732,343
New York	6,152,620	810,113	5,342,506
North Carolina	2,935,362	385,355	2,550,007
North Dakota	1,970,643	259,706	1,710,936
Ohio	4,571,398	599,707	3,971,690
Oklahoma	2,938,305	385,270	2,553,034
Oregon	2,027,318	264,057	1,763,260
Pennsylvania	5,343,256	702,588	4,640,667
Rhode Island	609,375	80,000	529,375
South Carolina	1,692,531	222,927	1,469,603
South Dakota	2,033,359	267,594	1,765,764
Tennessee	2,650,535	348,376	2,302,158
Texas	7,787,837	1,017,616	6,770,221
Utah	1,408,865	185,304	1,223,560
Vermont	609,375	80,000	529,375
Virginia	2,293,481	301,100	1,992,380
Washington	1,935,403	254,186	1,681,216
West Virginia	1,337,294	175,076	1,162,217
Wisconsin	3,039,195	398,482	2,640,713
Wyoming	1,564,886	205,876	1,359,009
Hawaii	609,375	80,000	529,375
Totals	$121,875,000	$16,000,000	$105,875,000

Paving a Road Through Indiana Dunes

Pictures from

J. T. HALLETT

Road Engineer, Indiana State Highway Commission

Chesterton-Dunes Park Road Before Paving

Early Grading and Widening Operations on the Chesterton-Dunes Park Road

Excavating During Spring of 1931, Using Industrial Equipment for Hauling

Construction View Showing Grading Operations with Industrial Track Along Road. Sunderman Construction Co. Was the Contractor

Completed Road Opposite Entrance to Dunes State Park

Another View of the Completed Chesterton-Dunes Park Road, Project 180B of the Indiana State Highway Department

Another 1931 Road Job. A 72-Ft. Cut Through Shale and Limestone on Loogootee to Shoals Road in Southern Indiana

Needed Reform in Textbooks

By WILLIAM T. LYLE
Professor of Civil Engineering, Washington and Lee University, Lexington, Va.

BOOKS which are advertised as textbooks are presumably written for students. There are good reasons why the successful practitioner who has not come into personal contact with students is partially disqualified as a writer of textbooks. There are also good reasons why the cloistered college professor who has not kept in personal touch with practical work is also disqualified in considerable measure for the same task.

While textbooks of the former generation were not without serious faults, yet there were some which were admirably written and which on their individual merits passed through many editions. To mention some of them might seem invidious and yet any teacher beyond the age of fifty can at least name a few at a moment's notice. Some of these books required years to produce and received the prolonged commendation which their merits deserved.

Nowadays, technical books in general are often written by the mass-production method. The parts as prepared by leading specialists do not cohere and form a unit. Of course it will be admitted that there may be editorial supervision, but it would seem impossible to prepare a book by this method which is an organic whole. Fortunately, however, most textbooks are written by one man, usually with a greater or lesser amount of help on the part of his younger assistants, and therefore are more or less unified.

But even coming from a single pen, a book may present indications of composite authorship. I refer, of course, to the reprehensible practice of incorporating in fine print various methods, devices and specifications without explanation or elaboration. Such quotations should be carefully gone over by the author of the book and presented in such a way as to supplement and explain the main body of the text. An effort should be put forth by the author to make them interesting and attractive and to the point. In many textbooks such an effort is wholly lacking.

Furthermore, the practice of presenting illustrations obtained from other sources and prepared for other purposes should be stopped. Illustrations with superfluous data defeat their purpose. The illustrations should be prepared for the book, or, if not so prepared, should be suitable to it.

The use of definitions taken from highly specialized sources should be so modified as to make them understandable by the ordinary engineering student. For example, in the definition of asphalt, what ordinary civil engineering student has even a glimmer of an idea of the meaning of the words, "cyclic and bridge compounds"? Or what civil engineering student who has not had an exceptionally thorough course in the biological department knows the meaning of the word "tubifex," dropped into a book like a meteor from heaven.

There is room for a great improvement in textbook writing. The author of a textbook should have the college man continually in his mind's eye and should write *for* him and *to* him. His chief motive should be one of unselfishness; otherwise he had better enter some other field of authorship.

Traffic Improvement Aids Unemployed

By BURTON W. MARSH
Traffic Engineer, City of Philadelphia, Pa.

Americans do not want doles, they desire to *earn* their livelihood. Why not put unemployed to work on prepared programs for traffic improvement?

Last winter Philadelphia carried out this idea with fine results. What did these workers do? Read the following summarized illustrations of the work.

1. Some 87,000 accident records were transcribed and sorted—and over 50,000 records were put into shape for ready use in devising remedial measures.
2. Four accident spot maps were made.
3. A list of 166 intersections having 10 or more reported accidents in 1929, was developed.
4. Field studies were made for over 100 of the worst accident intersections.
5. Traffic studies were made in the vicinity of approximately 400 public and parochial schools. About 100 schools will have traffic protection this fall, because of this work, and as rapidly as possible all schools will be protected.
6. Some 1,400 traffic signs were made and erected.
7. Some 500 street name signs were made and erected, or cleaned and painted.
8. 137 U. S. and State route signs and posts were erected.
9. 225 one-way arrows were constructed.
10. 200 mechanical semaphores for use by officers, were repaired and painted.
11. 990 electric traffic signals were cleaned and 233 were painted.
12. 35,000 feet of traffic control cable were pulled in ducts.
13. Traffic volume counts were made at some 1,700 intersections.
14. Considerable parking data were obtained.
15. Numerous types of bus information were obtained. When completely summarized and analyzed, the obtained facts will lead to recommendations for improvements in bus conditions in the central business district.
16. Taxicab data, including use of taxicab stands and taxicab movements on various streets, were obtained, looking to improvement of taxicab conditions.
17. Educational Work — One unemployed man, with publicity experience, did this valuable work, for approximately two months.
18. Statistical Work—While this is not one of the most spectacular parts of the work, it is one of the most important.
19. Drafting Work—As with the statistical work, it is difficult to effectively summarize to the layman the value of the drafting work.

What grade of results was obtained? In general, the work was truly satisfactory.

This coming winter, we hope to secure considerably more unemployed help on traffic improvement work. We emphasize that traffic improvement work is not artificially made work and that the results secured warrant further assistance.

Surely unemployment relief offers an unusual opportunity for communities to bring about marked improvements in one of their most pressing problems—traffic relief.

EDITORIALS

How Britain Reduced Wages Without Reducing "Wages"

GREAT BRITAIN abandoned the gold standard a few weeks ago. The result has been a drop of about 20 per cent in the value of the pound when measured in gold. The effect is the same as that of any other inflation of paper currency. Employees are now paid in a depreciated currency. They get the same money wages as before but it will buy 20 per cent less wheat, cotton, and other imported commodities.

However, the effect is not so baleful at first as it seems. Already many English cotton mills that have been closed for years have resumed operation, for, because of the reduction in gold wages, the owners are able to sell their goods in competition with those of Germany, France and other countries.

Several European countries have followed Great Britain's lead, and the upshot is likely to be a race to see which one can debase its currency the fastest. If so, they will all reap the whirlwind within a few years, just as most of them reaped it after the war.

During a prolonged period of currency inflation, profits rise faster than wages. Hence nearly every one who desires work can get it. Competition among employers sends up "real wages," and then every one is happy—everyone but those that have loaned money for long terms. When such a lender is repaid in depreciated money, he resolves to lend no more. Usually he reaches that conclusion long before his loan is repaid. When a sufficient number of such lenders have decided that the more they lend the more they will lose, credit streams begin to dry up. Shortly thereafter comes the great economic drought—an industrial panic caused by inflation of currency.

Prior to the next European panic of that sort, there will probably be several years of prosperity. Great Britain is evidently just entering the prosperity part of the cycle. Among other things, British activity will probably send the price of our cotton and wool up sharply. Copper will follow, and so on.

Currency inflation is like taking "dope." It ends in disaster, but its addicts are beyond advice.

H. P. Gillette

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Dull Picks

IN their zeal to provide work for the unemployed county, city, and state unemployment committees are recommending that machinery on road work be replaced by man power. In cases reported to the writer excavating equipment was removed and men with picks and shovels placed on the job. Right now, be it understood that this was done in opposition to the advice of the engineers in charge. They are county jobs. Why do supervisors employ such extravagant, uneconomic tactics? The answer is—Politics. The line of least resistance for these county officials, in serving the God of politics, was to acquiesce to the demands of the local unemployment relief committees who know nothing of economics. The supervisors and commissioners think that they are serving their constituents and managing the counties' business in the best interests of the taxpayers. Are they? No!

To carry their logic to a farther conclusion these men should be given broken shovels and dull picks so that more men would be required. Basket porters for hauling the dirt should replace the trucks.

It is unnecessary for me to show what happens to unit costs in this case. Instead of getting more work for less cost these counties are getting less work for more cost.

By proper planning of public construction the unemployed could be put to work and sorely needed low cost road mileage increased. This increase can be accomplished with small additional expenditure. Roads pay for themselves. The fundamental principle of road finance in the United States has been that a highway must pay for itself. This alone has justified the cost of road construction. That highways are a fundamental necessity in a civilized, progressive, and ambitious nation is an undisputed fact. Why then retrograde? Rather we should devote some energy to solving our unemployment problem, so far as road work is concerned, by tying our communities together with serviceable year 'round roads. Now, while costs are low and labor available is the time to extend our activities. Use sharp tools and as much labor saving machinery as is economical for the condition. Officials who remove machinery from a road job so they may revert to construction methods employed by their great grandfathers acknowledge either their lack of intestinal fortitude to carry their share of the load which makes for city, county, state, and national progress, or their ignorance and inability to plan for economic development.

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Curve Crown Tolerance

AN uneconomic refinement which is not justifiable except by the letter of the specifications or plans on a job should not be exacted of the contractor. In fact, specifications and plans should be tolerant enough to permit of omitting such refinements. A case which comes to the front quite prominently at the present time is the matter of eliminating the crown on curves on roads that are super-elevated on curves.

In the first place, crown is put in a road merely for drainage purposes. Superelevation is put on a curve ostensibly to counteract the skidding tendency of motor vehicles moving on the curve at high speeds. Present specifications require that the contractor eliminate the crown on superelevated curves. To do so requires holding up the progress of construction until the adjustments have been made to the finishing machine both approaching the curve and leaving it. Of what particular value is the requirement to eliminate the crown? How much effect does the one inch crown have on a speeding motor vehicle? For all practical purposes—none. However, if desirable to overcome this inch would it not be just as effective to raise the superelevated side an extra inch?

Plans and specifications are necessary guides to the performance of contract work and as such are good things. But they should be more of a guide to judgment on construction practices than a binding legal

code on methods of procedure. As engineers we should learn to know the value of tolerance; when or when not to apply it. Uneconomic practices, if possibly avoidable with practically comparable results, should be eliminated.

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Low Cost Road Movement

FAIRWEATHER roads have seen their hey-day. Popular opinion is slow in forming but when once moving is a powerful force. Unmistakable indications that there is a popular demand for low cost year 'round roads have been observed by those who are watching the progress of highway development in this country. As a consequence, manufacturers and engineers are bending their efforts toward fulfilling the demand for more miles of road.

Most of the present mileage of state highways has been surfaced with some high type metalling. For this work certain income of the states has been obligated. But some of the obligations will start maturing before many years roll by and this income should be diverted to the counties for use on lower cost road surfaces. To accomplish this end necessary favorable legislation must be enacted. Committees of the American Road Builders Association are actively engaged on this work and at the coming convention in Detroit a preliminary report on the relationship of state to county finance will be discussed. An advance questionnaire sent out by the writer to those in touch with county highway development showed a preponderance of opinion in favor of the county maintaining jurisdiction over county and township road work and road funds. Popular opinion, indicated by these replies, is favorable to more mileage of farm-to-market roads.

This popular opinion will quickly make itself significant at the ballot box and for that reason county officials should keep their constituency fully informed as to proposed methods of financing county road system improvements. It is a well recognized principle of American government that American communities demand that they control their tax expenditures.

By keeping jurisdiction of county highway improvement funds within the control of those who use the county roads the most, that is, the county taxpayer, subject perhaps to advice from a technical state organization, local communities will get back of the low cost road movement much more quickly than by giving state highway authorities bureaucratic control over their roads.

In places the writer has received complaints about turning over county road systems to the state highway authorities. In some states where the law allows additions to state highway systems the complaint is made that the roads taken over by the state are those on which county funds have already made surfaced improvements. It has been said that the states took over their good roads and left the poor, unimproved roads for the counties to work on.

County organizations of road officials should promote legislation in their various states to make it possible for them to get more funds. They should keep jurisdiction of county and township road work within the county and should adopt definitely planned systems. With these actions will come better business methods and more miles of year 'round roads. Machinery is now being developed to lay surfacing on roads where the county does not want to lose its investment in present gravelled roads.

Popular opinion is favorable to the low cost road movement. Equitable handling of improvement funds will hasten the completion of these farm-to-market systems.

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This Is Your Business

NO MATTER whether you live in one of the larger cities, on a trunk line highway, or in the most remote corner of some rural region, you are directly interested in the improvement of every mile of road.

In the interchange of the products of the farm and of the factory is it not strange that the opinion has become generally accepted that the road between the two, producers and mutual consumers, is the sole concern of the farmer?

Certainly added costs of transporting any of the products of either farm or factory must reduce the net income of both.

The improvement of the strictly rural highway is quite as definitely a matter of general public interest as is the development of trunk lines.

To be sure, a capillary system of roads would be of little value unless the arteries were first constructed but do not jump at the conclusion that when a system of roads connects the principal cities with each other, the city resident has no further direct interest in road building.

Much more than half of his staple foods, dairy and poultry products are produced alongside dirt roads that are entitled to the name "road" only when the sun shines. Rural roads are a national problem and not wholly a local question.

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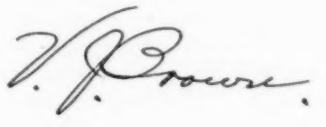
Voiding the Time Clause

WHILE most public contracts contain time of completion clauses they are seldom enforced. Why not? Why should not a party who contracts with a state, county, municipality, or the federal government to complete a certain piece of work on a specified date be required to live up to the contract? Why can contractors so easily slide by this clause, apparently intending to do so when the contract was let?

The public expect to use an improvement at a certain time. Delay in opening it for their use is additional and unwarranted expense to the taxpayer. Time should be the meat or key of any public contract. It is regarded so by most public contracting officials but laxity in enforcement has come to be expected by contractors. In fact, so prevalent is the weakness of engineers in charge that irresponsible contractors are justified in assuming that they will get by even while preparing their bids. Engineers and inspectors in their zeal to become good fellows in the eyes of the contractors who are working for them pass lightly over seemingly unimportant points which when added together contribute to the cause of over running the specified time of completion.



County and Township Roads

A Section Devoted to the Interests of Those Responsible for Secondary Road Improvement

By H. J. McKeever

Obstructing Headwalls of Narrow Bridges and Culverts Are a Serious Night Danger

Test Your Roads for Night Driving

Headlight designers and roadbuilders have mutual problem to solve in reducing accidents

UPON being asked what improvement is most urgently needed to render highways safer, a prominent highway official instantly answered, "Improve night driving conditions! When highways as well as vehicles and their headlamps have been rendered safe for travel after dark, we will have advanced a long way toward reducing all highway accidents."

That is a different way of looking at this much-discussed safety question, and is it not a good one? Unlike the highways of Europe, which are still virtually abandoned at nightfall, America's roads teem with vehicles whizzing through the night, one of the significant trends in traffic being a rapid increase of travel during the hours of darkness.

Theater goers, city folks returning from evening jaunts, and others pack important roads to capacity before midnight. Tourists and business men are finding it expedient to travel in the "wee sma' " hours, when they have (or did have) the road more to themselves (and when the speed cops are asleep). Trucking is on a 24-hour schedule, and many large trucking firms make shipments entirely at night, leaving business hours for loading and unloading. Buses run all night. Farmers haul livestock in the cool of darkness, and time their produce deliveries to reach markets just before sunrise. Milk trucks nightly comb the highways near large cities.

One of the dangers of night driving is the glare of headlights. This glare not only blinds motorists but has sometimes blinded road officials to the fact that there are other ways of making night driving safer than correcting headlights—ways that only highway engineers and officials can follow through.

An interesting parallel might be drawn here. Though millions of obsolete or defective lights are still in service, headlights have been vastly improved. But not satisfied with their progress, headlight makers are still working in the laboratory for better lights.

Similarly, though thousands of miles of older roads now in use were dangerous from the start and are now even more so because of changing conditions and inadequate maintenance, highway design has in many respects kept apace. But are you still working in your "laboratories?" Are you steadily bringing old

Bridge Rails and Other Obstructions Close to the Pavement Painted White Are Good Guilding Marks

The Proper Location of Signs to Be Seen Easily at Night Is a Subject Worthy of Much Study. This Sign Is on the Shoulder and Next to the Ground

roads up to the new par of safety?

Here is a field of study which engineers specializing in highway marking have studied, but which the great majority of those in charge of local and other road work have not found time to include in their list of duties to be performed.

Put Roads to a Night Test

Do your roads meet the test of night driving? The best way to answer that question is to drive over the roads at night, in all weather, in hours when most heavily used, and using average headlights, and check up on the various elements of your roadways, new and old.

Surface Visibility.—Let us first make a few comparisons of various surface types as to their visibility at night. Admittedly, light colored pavements show up better than dark. But black top roads, on the other hand, are in contrast with light shoulders and features painted white, and their edges can thus be clearly defined.

Pavement Marking.—The center stripe has proved a boon to the night driver, especially when negotiating that critical few hundred feet just before meeting a pair of blinding lights. You may feel that stripes are of questionable value. If so, study their effect at night for a while before deciding once and for all. Edge stripes were long in being initially adopted, but the California highway department has led the way by painting them along certain roads, and reports of their effectiveness should be studied.

Railroad crossing and other warning signs painted on the pavements aid night drivers, but opinion is divided as to whether shoulder markers or other devices are just as effective.

Signs and Markers.—You will probably find that signs within five or six feet of the edge of the traveled road—that is, at the shoulder's edge—are safely out of the way and yet can be seen while driving with average headlights. Check up on the position of all essential signs. Also make a note of their color and size of lettering. Perhaps an improvement could be made there.

Alignment.—A winding, hilly road offers night drivers the choice between taking chances and cutting down speed. White guardrailing at turns and on fills and numerous danger signs improve such a road, but its danger and inefficiency at night is one of the first reasons for its early reconstruction as traffic demands increase.

Night Driving Is Increasing in Hazard as Traffic Increases in Speed and Volume. What the Driver Can See by His Headlights Should Be a Matter of Concern to Road Officials

Shoulders and Shoulder Obstructions.—Here is the critical part of the road, night or day, but especially at night. Four cardinal requirements of a shoulder capable of serving traffic safely at night are (1) high visibility, (2) firm smooth surface, (3) adequate width, and (4) freedom from obstructions. True, grooming of shoulders along seldom-used roads to meet all these four requirements would be a luxury. But along high-speed main arteries, requirements for safe shoulders should be met regardless of the cost.

Many miles of asphalt and brick pavements in Indiana have been given shoulders of white limestone, rendering their edges clearly defined and making them safe to swerve onto in emergency. The Indiana highway department also paints every headwall, bridge railing, mailbox, tree and other encroaching object white. Pending widening of drainage structures and elimination of protruding headwalls, this is a particularly important step; any object within the shoulder lines may sometime have to be dodged at night.

Guardrailing, too, should be repainted white often enough to maintain the very highest degree of visibility. A number of states and counties paint truss bridges white, yellow or gray.

White Limestone Shoulders Clearly Defining the Pavement Edge and Themselves Plainly Visible, Have Rendered Many Miles of Indiana Highways Safer at Night

DON'T BE AFRAID TO LET THIS SUBJECT WORRY YOU

This article's main purpose is to set you to thinking about the roads as the user finds them long after you have called it a day. Here are some concluding thoughts:

1. Headlights are being made safer. Are you, as a road official, also contributing to safer night driving?

2. When an accident occurs at night, find out what the road had to do with it and promptly take the steps necessary to render that point on the road as safe as possible.

3. Shoulders should be adequately wide, adequately firm in all weather, unobstructed, and above all visible at night. Heavy traffic warrants an investment to make and keep shoulders safe for the emergencies of night traveling.

4. Study your existing road surfaces and appurtenances at night, mile by mile. A road found reasonably safe at night will be reasonably safe at all times.

Acknowledgment.—This article first appeared in *The Highway Magazine.*

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County Maps 5-Year Road Program

In Manitowoc county, Wisconsin, an ambitious five-year highway construction program is being mapped out by highway officials, according to the *Western Builder,* and will be presented for approval at the annual meeting of the county board, on November 3.

The road-building plans are being prepared by members of the county highway committee—Ferdinand M. Schneider, August Last, and Charles A. Drumm—assisted by Ed Fenner, county engineer, and Ed Berkedal, county highway commissioner. Conferences are being held with local and county highway officials, with representatives of the state highway commission and with industrial and business interests.

The new program would include the concreting of highways 10 and 31 to the county lines, the connection of 42 through Manitowoc Rapids to the Y connecting 141 and 31, the completion of County Trunk A, to Kiel, consideration of Highways 32, 149, 163 and the road from Mishicot to Cooperstown to complete the loop, the Cleveland avenue lake shore project connecting with Waldo boulevard, and the proposed lake shore drive.

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County Consolidations Suggested

Either actual county consolidation or consolidation of the activities of groups of counties may result from proposed committee activities of the Iowa legislature. This step has been proposed as one of the methods of reducing the cost of government in Iowa and will be considered by the legislative committee on reduction of expenditures. Local county advisory committees which were appointed by representatives and senators from the legislature worked with the legislative committee to effect a lowering of governmental costs. The idea for this legislative committee on expenditures resulted from a recommendation of the Interim Committee on Tax Revision which reported to the 1931 General Assembly. The local county committees are meeting with representatives of commercial and civic organization and with the legislative committee to present the local suggestions on where and how economy with resulting tax reductions, can be effected. This is certainly one step towards getting back to the old slogan of a government "of the people."

Secondary Road Booster

Following is an abstract from the annual report of W. G. Armstrong, Past President of the National Rural Letter Carriers' Association:

Road Legislation

Much time was given to the discussion of Road Legislation with the Members of Congress and a much closer relationship and clearer understanding was developed with our friends, the Congressmen.

For some years past our association has enjoyed a most delightful contact with the American Road Builders' Association, from which is resulting a most beneficial relationship. In January of this year your association was invited to be represented and have a part in their annual convention, held in the City of St. Louis, Missouri. We attended this convention and read a paper on "The Building of Public Opinion for a Secondary Road System." This is a worthwhile contact and one from which much good is certain to result.

Program

We recommend the concentration of our efforts upon three major objectives for the coming year:

* * * * *
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The establishment of roads run concurrently with the progress of a nation. The first efforts of the founders of our country was the planning of thoroughfares by which the inhabitants of one section might carry on business intercourse with adjacent sections. Canals and waterways played an early important part. Later came the railroad and paved highway. Today our highway system receives greater attention and is the recipient of larger appropriations than any other single public enterprise. Rightly so, for the life blood of America's progress and advancement flows over their surface. No system approaches perfection that does not guarantee to every citizen his full rights.

We, therefore, believe this association should use its best offices in an endeavor to more equitably distribute road funds and aid in securing greater improvement on lateral or "Farm-to-Market" highways.

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Resolution Adopted by N. R. L. C. A.

Among resolutions adopted by The National Rural Letter Carrier's Association in convention assembled in Los Angeles, August 18-21, 1931, was the following:

XI.
ROADS.

RESOLVED that we recommend the continuation of the efforts of our Association and its officers in behalf of better roads.

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Woman Road Officer

La Salle county, Illinois, has a woman county highway commissioner. She is Mrs. Margaret Burke, aged 39, the mother of eight children, elected to fill the unexpired term of her dead husband. She is the first woman in Illinois to hold such a position.

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ROAD CONSTRUCTION IN AUSTRALIA.—Road construction in Australia during the past year was limited by the reduced revenue available to the Main Roads Board. For the nine months' period ended March 31, 1931, the Board spent a total of nearly $11,436,000 on road construction and improvement, slightly more than half of this amount being expended in construction of roads and bridges.

Before *the county commissioners of Columbiana County, Ohio, decided to improve their planned system of county highways, traffic used this crooked, dangerous road which constrained farmers from hauling maximum loads.*

After *the engineers finished with the job a hard surfaced road removed the dangerous bends and reduced the grades. Thus the communities were tied together so stoutly that neither Old Man Depression nor Big Bill Taxes can make them wish for the "good old days" of mud roads.*

The Start

The Finish

◆

Adequate bridges of low cost can be built of treated timbers and justify themselves on the construction budget of any county contemplating a planned system of farm-to-market roads. Design of the floor systems of these bridges require the utmost attention in order to allow the flooring to run lengthwise rather than crosswise of the roadway.

Too many of our present structures shake a motor vehicle to pieces as it crosses them because of the worn cross planking. Smooth riding qualities should be a primary consideration in the design of floors for timber bridges.

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Improved Market Roads Makes Farming More Profitable

Farming Region of Smith County, Texas, Gets Direct Benefits From Program of Local Road Development

By I. H. CRUTCHER, JR.
Maintenance Superintendent, Tyler, Texas

SITUATED approximately 90 miles west of the Louisiana line, Smith County, Texas, comprises an area of 920 square miles and supports a population of approximately 50,000. Tyler, the county seat, with a population of 19,000, is about 105 miles east of Dallas in a fertile agricultural region requiring a network of highways to serve farmers.

With a soil suitable for the growth of fruits and vegetables, as well as the standard crops of cotton and corn, an average rainfall of from 36 to 48 inches and an average mean temperature of 65 to 70 degrees. Smith County grows a wide variety of agricultural products. Tomatoes, peaches and blackberries are extensively cultivated, as are also watermelons, cantaloupes, strawberries, sweet peppers, sugar cane, asparagus and other vegetables, while the county is perhaps the leading commercial rose growing county of the South.

Naturally, with such diversified agricultural products, many of them necessitating quick and easy access to market, the county early saw the necessity of an adequate road system. In 1919 a road bond issue of $1,500,000 was voted, $950,000 to be used for the building of approximately 163 miles of first-class roads comprising the backbone of the system, approximately 120 miles of which was on the designated state highway system. The remaining $550,000 was to be spent on a feeder system of lateral roads.

To facilitate the work, the Smith County commissioners' court appointed a county highway commission of seven outstanding citizens, one from each of the six road districts and an extra member from the county seat, to act as the court's agent in handling the finances and settling the policies of all work in connection with the building of the cardinal system. This commission employed D. K. Caldwell as engineer.

System Now Largely Improved.—During the period of construction, $800,000 in state and federal aid funds was allotted to the county, and with this total of $1,750,000 the commission built and surfaced the entire 163 miles of the cardinal system. Approximately 10 miles of the 120 miles of designated state highways was surfaced with concrete, and 50 miles with 2 and 3-course penetration asphalt on local iron-ore gravel base.

Since the completion of construction in 1924, approximately $200,000 of state maintenance funds has financed 2-course asphalt topping on the remaining 60 miles of the state highways. The 43 miles of the county cardinal system which was not on the designated state system was surfaced with iron-ore gravel at the time of construction.

Just recently the state highway department has made a new designation which will embrace 12 miles of this 43 miles, and funds have been allotted for a 2-course asphalt surface, so that the end of this summer, ten years after the voting of the bond issue, will see 132 miles of the cardinal system surfaced with concrete or asphalt.

Much of the credit for the energy and foresight with which the projects were so economically handled is due W. B. Marsh and Will Castle, who alternated as chairmen of the Smith County highway commission, and to Mr. Caldwell, the engineer in charge.

Details of Bituminous Surfaced Iron-Ore Gravel.—Perhaps the most interesting phase of this work has been the extensive use made of bituminous surfacing on iron-ore gravel and topsail bases. These materials were available locally on short hauls and proved economical and satisfactory for surfacing the roads when first constructed. The enormous increase in traffic which took place with the improvement of the roads even before the completion of construction, soon demonstrated however that this iron ore alone would not serve as a durable surface. The commission turned then to 2 and 3-course inverted penetration asphalt, using the iron ore as a base, and secured most satisfactory results.

The method followed was to add enough iron-ore gravel to the old surface to bring it back to proper thickness, scarify and reshape this material, and after it had been thoroughly compacted by traffic lay the asphalt surface on it. The quantities most generally used for this surfacing were one gallon of asphalt per square yard, one cubic yard of crushed limestone (1¼-inch maximum size), to 40 square yards, and one cubic yard of pea gravel to 80 square yards of surface.

One third of a gallon of asphalt was applied as a priming coat to the base after it had been carefully cleaned by brooming, and the limestone was then spread on the road, dragged to insure smoothness, and rolled. The final application of two-thirds of a gallon of asphalt was then placed on this limestone, covered with the pea gravel and the road rolled and opened to traffic.

Good Drainage Improves Lateral System.—The lateral road system, with a much smaller fund to apply on a much greater mileage, presents a difficult problem. The county commissioners' court, appreciating the excellent results obtained by the Smith County highway commission, appointed a similar commission for each of the road districts. Realizing that with the money at their disposal, expensive surfacing was out of the question, the commissions concentrated their efforts on securing proper grading and drainage structures. Smith County lies in a hilly section with hundreds of small

spring branches and creeks, so that with the drainage taken care of the battle was half won.

The addition of many new drainage structures and replacement of numerous old wooden bridges by more modern drainage openings, perhaps more than anything else, put many miles of roads on a nearly all-weather basis.

Local iron-ore surfacing was used through sandy areas and the entire secondary or feeder system thus put in fairly satisfactory shape.

Today, as a direct result of its road system, the county is known far and wide as one of the most progressive in East Texas. Its valuable food products move rapidly by truck to railroad shipping points, and in ever-increasing amounts direct to markets in Dallas, Shreveport, Fort Worth and other urban centers which connecting systems of highways in adjoining counties have made accessible by truck. The county is prosperous, for the farmers with a ready all-weather outlet to market are turning from the single crop idea to the more profitable diversified farming. The dream of a few progressive, far-sighted citizens of ten years ago has become a reality and the whole country has profited.

Acknowledgment.—This article first appeared in *The Highway Magazine.*

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Rebuilding a Bituminous Macadam Ohio Highway

By O. H. KEIST
Engineer, The Blaw-Knox Company

ONE of the big problems confronting our highway department today is how to economically salvage a road that has become badly worn and rough, but which has sufficient metal in its construction to warrant some type of resurfacing being done. Combined with this is the problem of widening to accommodate present day traffic conditions and at the same time hold the reconstruction costs to an economical minimum.

The Ohio Department of Highways is trying a number of methods, all of which have individual merits worth considering. The section of State Route No. 50 between Marathon and Dodsonville, Ohio, was let to the S. Monroe & Sons Co., of Portsmouth, Ohio. The reconstruction called for two widening curbs, two feet wide, and having an exposed curb surface 9 in. wide with a 1½ in. drop to take care of the 1¾ in. Ohio

Fig. 2—Placing Leveling Course of Crushed Stone and Dust

specification T25 cold mix (see Fig. 1). This made the completed reconstruction 20 ft. over all. The contractor set up an A27E paver at Dodsonville and hauled mixed concrete to the curb gang; completing an average of 3,000 feet per day.

After completing the curbs it was decided to try a mechanical finishing machine to spread the (T25) cold asphaltic mix. This was done by adapting their Ord finisher to operate on the curbs.

Due to the unevenness of the old road surface the deepest holes and depressions were filled with crushed stone and covered with a T25 patch. To check this unevenness and secure a fairly uniform base for the new surface, a templet was made which was dragged along the new curbs indicating the places which needed building up. This is shown in Fig. 2. After old road surface was checked and patched it left a fairly uniformly crowned grade for the top course, as shown in Fig. 3 and 4. Fig. 4 also shows the new curb very distinctly. This patching of the old road was carried on a mile or so ahead of the top gang.

To secure the necessary excess of thickness of material to allow for roller compaction, angle iron riser strips were made. These were dove-tailed at each end to prevent them from being displaced as the finisher advanced. These risers were ten feet long and easily handled by one man. They were built one-half inch thick, but at times one-half inch excess was not sufficient for roller compaction and when this occurred a flat steel strip 3 in. wide was first laid on the curb and the riser placed on them. These are shown in Fig. 5 and 6. Fig. 3 also shows distinctly the width of the new curb construction.

The material (T25) was trucked to the job and dis-

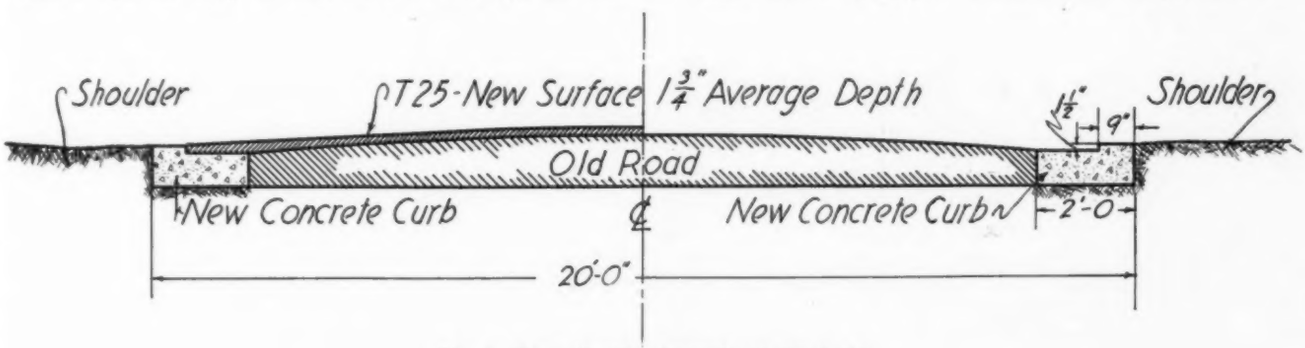


Fig. 1—Cross Section Resurfaced Road Job

Fig. 3—Old Road Surface Brought to Average Uniform Crown and Grade

tributed in piles, as shown in Fig. 7. Due to its stiff and sticky consistency stone forks were used for spreading. In spreading the material for the mechanical finisher care had to be taken not to allow too great an amount to accumulate in front of the front screed. When this occurred and the grade was a trifle high reducing the thickness of the top from 1¾ in. to approximately ¾ in., a sliding action took place. Due

Fig. 4—Close-up of Curb. Drop Is One and One-Half Inches

to this variable grade condition spreading had to be closely watched and the use of spreading boxes was deemed inadvisable. Fig. 8 and 9 show the Ord finisher handling the spread asphalt. Fig. 8 is an excellent view of mechanical spreading, showing the use of the riser strip for compaction.

Fig. 5—Close-up of Angle Iron Riser Strip Showing Detail of Interlocking Device

As only one course material was used, the operation remained the same throughout the day. The result of machine finishing was a uniformly crowned spread of

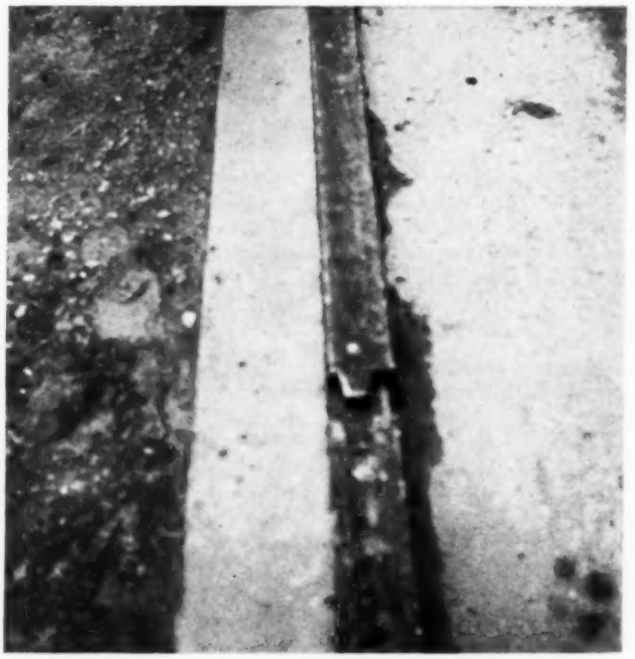


Fig. 6—New Curb With Angle Iron Riser in Place

material; exceptionally uniform in surface texture. Fig. 10 shows the surface as left by the finisher before rolling.

As a rule the first rolling was done the following day with a three wheel 10 ton roller. This operation is pictured in Fig. 11. The delay in rolling gave the

Fig. 7—Dumping a Load of Cold Mix (T25) on Grade

Fig. 8—Ord Finisher Screeding the Freshly-Laid Mix

Fig. 9—Finishing Machine Produces Smooth Riding Surface

liquefier time to partially evaporate. The day following the first rolling with a three wheel ten ton roller, it was finished with an 8 ton tandem roller.

By hand raking an average of 1200 ft. of finished road per day was secured. By use of mechanical spreading 2500 to 3000 ft. of finished road was obtained. This cut the construction time in half, opening the road to traffic in half the time, which is highly desirable in reconstruction.

Fig. 10—Even Texture of Material Shown

Fig. 11—Rolling Compacts Mass to Smooth Uniform Surface

The personnel consisted of the following: 8 fork men spreading in front of finisher, 2 shovel men placing material along curbs, 1 finishing machine operator, 1 back rake man, 2 men moving riser plates ahead, 2 roller men, 1 strut foreman, J. O. Monroe, superintendent in charge of work, O. E. Barker, inspector for the state, and D. R. Roush, resident state engineer. The T25 was produced by the Ohio Road Improvement Company and mixed and shipped from their Kenton, Ohio, plant. Trucking was handled by D. H. Wunker of Cincinnati, Ohio, who unloaded material with a Byers crane and Blaw-Knox bucket.

THE FIRST CHINESE GOOD ROADS CONFERENCE.—The first national good roads exhibition opened in Shanghai Sept. 12 with over 50 exhibitions of motor cars, trucks, road-building machinery, equipment and materials, displaying merchandise. American, British, German, French and Chinese manufacturers were represented. First good roads conference convened Sept. 19 with delegates from over 26 provinces in attendance.

Salvage Value of Old Concrete Pavement

On the back slope of cuts in places where excavation came close to a property line or fence on the Roosevelt Road widening job through Du Page County, Illinois, chunks broken out of the old worn out concrete pavement were laid in place to prevent scour or wash of the back slope. The irregularly shaped chunks were butted together and the openings filled with earth. In effect, the back slope was riprapped; an excellent idea. The accompanying picture fails to do justice to the beauty of the paved back slopes.

[*ROOSEVELT ROAD, DU PAGE COUNTY, ILLINOIS*]

Rather than throw the broken pieces of old concrete pavement into a dump or swamp, engineers conceived the idea of riprapping the fills of Roosevelt Road as well as cobbling the back slopes of cuts. It stands to reason that there will be no washouts on this fill. The old road was widened to 40 ft. and rough or badly broken sections of the old slab were reduced so that one man could handle the chunks. When grass grows in places where the roots can take hold this fill slope will present a pleasing appearance.

The Road Builders' News

Road Show Exhibit Space Nearly All Contracted For

Over 83 per cent of the available exhibit space for the 29th Annual Convention and Road Show of the American Road Builders' Association was contracted for by exhibitors on Oct. 8, 1931.

The small amount of space remaining on that date, several months in advance of the last minute rush for space that always has existed, compares very favorably with the condition last year at the same time. At the space allocation on Oct. 8 there were 13 less exhibitors than at St. Louis allocation last year when the location of the space was decided.

Attendance at the Convention and Road Show gives every evidence of being as large as usual. Detroit has many advantages as a convention and exposition center, is easy of access, has excellent hotel facilities, and is the motor vehicle manufacturing center of the world.

The largest truck and motor freight exhibit that has ever been assembled may be seen at the Detroit Road Show. Speakers of national note will discuss all phases of highway transportation.

In addition to new and special equipment and materials exhibited at the 29th Annual Convention and Road Show, Detroit, Jan. 11-15, 1932, the following standard equipment and materials will be displayed by several hundred exhibitors:

Accessories, backfillers, batcher plants, bins, auto truck bodies, batch boxes, breakers, rooms, buckets, oil burners, cabs, cars, carts, compressors, cranes, crawlers, crushers, culverts, cutters, derricks, diggers, distributors, ditchers, drags, drains, dredges, drills, elevators, engines, excavators, road finishing machines, flooring, street flushers, forms, fresnos, graders, hammers, heaters, hoes, hoists, hoppers, joints, kettles, loaders, locomotives, maintainers, markers, mixers, motors, pile drivers, pipe, planers, plants, plows, posts, pumps, radiators, rails, reinforcement, rollers, rope, saws, scales, scarifiers, scoops, scrapers, screens, shovels, signals, snow removal equipment, spreaders, sprinklers, subgrading machines, sweepers, tampers, tanks, torches, tools, track, tractors, traffic devices, trailers, trenches, trucks, unloaders, vans, wagons, welders, wheels, winches, wire, wrenches, zone markers.

Pavement Finance for Cities

Methods of financing city pavements are being studied by the city officials' division of the American Road Builders' Association, according to A. Harrington Place, Engineer, Detroit Bureau of Governmental Research who is chairman of the committee.

What portion of the cost of a pavement should be borne by the general public in initial pavement, repavement, resurfacing, and source of revenue from which to pay the general public's portion of this cost?

On no other question relative to the financing of pavements does there exist a wider divergence of opinion and practice among city officials. A carefully selected committee will, at the time of the convention, have spent months on a thorough investigation of this subject and will submit definite conclusions supported by authoritative data as to the solution of this problem.

Other members of the committee are: A. D. Butler, City Engineer, Spokane, Wash.; J. F. Hale, City Engineer, Dayton, O.; W. W. Horner, Chief Engineer of Sewers and Paving, St. Louis, Mo.; J. J. Jessup, City Engineer, Los Angeles, Calif.; D. L. Lewis, City Engineer, Fort Worth, Tex.; M. S. Murray, Director of Public Works, Kansas City, Kans.; W. E. Sheddan, City Engineer, Jacksonville, Fla.; Capt. H. C. Whitehurst, Engineer of Highways, District of Columbia, Washington, D. C.; and J. M. Young, City Engineer, Dallas, Tex.

City Officials' Division Active

By P. F. SEWARD

Engineer-Executive, City Officials' Division, American Road Builders' Association

The City Officials' Division of the American Road Builders' Association is actively engaged in promoting the improvement of city streets as to finance, design, construction, maintenance and operation.

Organized efforts are being made to secure:

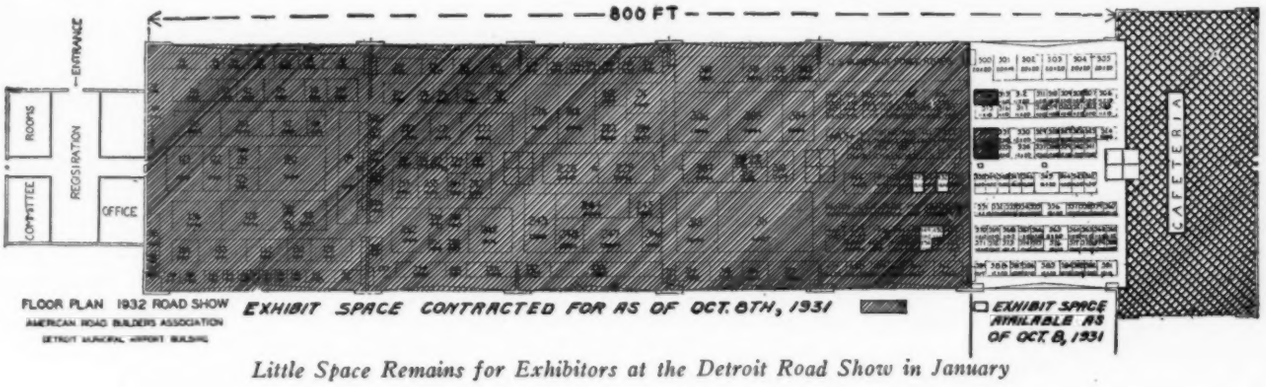
1—Satisfactory legislation.
2—Comprehensive plans coordinated with state and county plans.
3—Better business methods.
4—Standard specifications and construction.
5—Intelligent and systematic maintenance.
6—Complete publicity of city operations.
7—Standard traffic control as far as practicable.
8—Active cooperation of official and unofficial agencies interested in affairs pertaining to municipal street improvement.

The activities of the division are under the direction of a board of directors of 30 members, consisting of the president, four vice-presidents, the treasurer, the secretary, the last two living past presidents, and 21 directors. The 1931 research work of the division is being carried on through five major committees. Working with these committees are trained investigators from the staff of the Association.

At no time in the history of the country has the demand for economy and service in the expenditure of public funds reached the level which now exists. The division in preparation for the 1932 Convention has spared no effort to make this gathering instructive and attractive for city officials. The Convention program and the exhibits of equipment and materials will carry particular appeal for the city man.

Convention Program

Believing that best results can be accomplished with reports dealing with particular units of a general subject, the 1931



Little Space Remains for Exhibitors at the Detroit Road Show in January

View of Some of the Exhibits at the 1930 Road Show of the American Road Builders Association

work has been carried on in that manner. The chairmen and personnel of the various committees have been selected carefully from men who by training, experience and accomplishments, have established themselves as experts. The five committees reporting at the 1932 Convention are: Pavement Finance, Design and Construction, Maintenance, Traffic, and Airports.

Pavement Finance

What portion of the cost of a pavement should be borne by the general public in initial pavement, repavement and resurfacing? From what sources of revenue should funds be obtained to pay the general public's portion of this cost? On no other questions as to the financing of pavements does there exist a wider divergence of opinion among city officials. A carefully selected committee at the time of the Convention will have spent months in an investigation of this subject and will submit definite conclusions supported by authoritative data.

Design and Construction

Street Railway Track Pavement Design.—A survey of the design used in approximately 80 cities scattered geographically throughout the country and varying in population from 25,000 up, will be the basis for this portion of the report of the design and construction committee. Opinion is sharply divided between the rigid and non-rigid types of construction, and the committee hopes to develop recommended designs for each type.

Contraction and Expansion in Pavement Bases.—A careful correlation of research on this problem with recommendations will form a most instructive and interesting feature of the report of this committee.

Reinforcement of Light Pavements.—Probably 80 per cent of the cities in the country, and particularly those which in recent years have experienced rapid growth, are faced with the problem of streets built as light pavements for residential areas and which are now, due to varying conditions, being called upon to carry traffic for which they were not designed and under which they cannot endure. A careful survey will have been conducted to determine whether or not a satisfactory method has been developed for reinforcing such pavements. If such method or methods can be recommended same would prove invaluable to city officials. However, if no such development is practical, then a director of public works or city engineer would have the result of a careful survey to support his request for funds to replace such pavements, the maintenance costs on which had reached an impractical level.

Subgrades.—A non-technical, informative paper on this subject, developed to act as a guide to the paving engineer will fill an urgent and long felt need in this field.

Maintenance

In some instances inferior materials and workmanship, incompetent supervision and frequently gross negligence have retarded the development of maintenance it deserved. In the more progressive cities, the maintenance of streets is regarded as a highly technical operation entitled to the same painstaking care which is accorded construction. At the Convention a most able committee will present carefully reports on:

Control and repair of utility cuts.
Maintenance materials and machinery.
Low cost residential roadways.

The repair and reclamation of sheet asphalt streets using the surface heater method.

Maintenance methods and materials as practiced in Washington, D. C.

In addition to the above, a cooperative work with the International City Managers' Association is now in progress on "Uniform Street Maintenance Records." This work is just being started, and it is expected that approximately two years will be required before a complete report can be made on this project. In comparatively few cities are maintenance records kept in such a manner as will permit intelligent analysis of costs. This work will develop a flexible system for such records which can be readily installed in any city regardless of the size or form of government.

Traffic

No more important problem faces the average American city than how to provide best for the travel needs of its citizens. The United States is rapidly changing from a rural to an urban country. Cities are increasing in number, area and population as people congregate in the places where the industrial and commercial machinery of the nation is concentrated. In this transition the necessity for efficient and convenient transportation within cities has become more pronounced.

Directors of traffic are forced to secure the maximum results from the limited facilities available. It is with this idea that certain sections of the traffic report will be made. Views of the general concept of right of way, the laning of traffic, safety zones, traffic control at circles and multiple intersections, and applying the measuring stock to the need of the elimination of parking are subjects which will be reported. Reducing accidents and congestion by proper design and radii of curbs at intersections will also be presented with an idea of designing new work to eliminate undesirable conditions which handicap the smooth, uninterrupted flow of traffic.

Airport Surfacing and Drainage

During the next few years millions of dollars will be spent by cities throughout the country on the construction of airports. The report which will be presented is a joint effort of the Aeronautical Branch of the United States Department

of Commerce, the American Engineering Council and the American Road Builders' Association. A special research engineer has spent two years on investigations and research work and the report will represent the most complete and authoritative information on the subject.

IMPORTANCE AND EFFECT

The importance of municipal paving is apparent when one considers that in the cities of the United States there is expended each year for street purposes approximately one billion dollars. This vast sum of money is raised by property assessments, bond issues and general taxes. Every city dweller realizes the need of better and wider streets to accommodate the ever increasing volume of traffic and speed of vehicles. Each city is a separate corporation, having its own standards, laws and regulations. Standardization to effect economies in paving work is a pressing problem very real to every city.

Standardization of methods, materials, traffic and other problems of the division has interested city officials throughout the country. Of the 374 cities in the country with a population in excess of 25,000 the division has established, during the past year, contacts with 365. A growing willingness to accept the findings of the various committees has been evidenced. Wide use is made of the information service of the division and the many requests for facts regarding the constantly multiplying problems of city streets are given prompt and careful attention.

The effect of standardization on city practice is to reduce the cost of construction, improve maintenance methods, simplify assessments, facilitate traffic—all of which have a direct monetary value that is great.

There will be in Detroit in January a large attendance of city officials. Any such official joining in the discussion of the reports presented and examining the exhibits on display, will return to his city with a store of valuable information.

Road Builders Present 120 Radio Talks Advocating Increased Programs

Three radio talks over 40 independent stations will go on the air on Nov. 10, and 24 and Dec. 8 advocating the expansion of highway programs. These 120 talks have been arranged by the American Road Builders' Association.

The subject of the talk on Nov. 10 is "Highway Safety." On Nov. 24 a talk on the "Economy of Good Roads" will go on the air. "Road Building for Unemployment Relief" is the subject of the Dec. 8 talk.

The stations participating in this widespread broadcast for the benefit of highways throughout the country cover the entire United States and Hawaii.

The talk on highway safety calls attention to the three elements entering into the problem—the vehicle (now safe); the road (becoming safe); the individual (not thoroughly controlled). An appeal is made to the individual drivers to use courtesy and caution.

Highway building is represented as the biggest stock company project for the public in the world in the talk on the economy of good roads. "Economy in roads and streets is brought about by reducing losses. Economy is not merely a matter of reduced expenditures. On the contrary, reducing expenditures means increasing the losses under present conditions of lack of safety and costly congestion on the highways" state the speakers.

Road building for unemployment relief has been tested during the past summer and as with previous tests has been found most satisfactory for unemployment relief. No delay is experienced in starting work and all types of men from industries that are temporarily inactive are absorbed readily. More than a million men were employed directly on road building during the past summer, and two million other men were kept busy furnishing supplies, materials and equipment.

Included among the speakers who have accepted to go on the air up to Oct. 26 are the following:

Fred Houser, Secretary-Treasurer, Association of County Commissioners of Georgia, Atlanta, and S. B. Slack, Bridge Engineer, East Point—WSB, Atlanta; J. L. Bauer, State Highway Engineer, Trenton, and Frank K. Muta, President, State Association of Freeholders, Trenton, N. J.—WGC, Atlantic City; N. L. Smith, Highways Engineer, State Highway Commission, Baltimore, and H. D. Williar, Chief Engineer, State Road Commission, Baltimore—WFBR, Baltimore; W. A. Rathman, Director of Public Works, Buffalo, N. Y. and G. C. Diehl, of Buffalo—WBEN, Buffalo; C. S. Christian, State Highway Engineer, Little Rock, Ark.—KUOA, Fayetteville; H. C. Weathers, Testing Engineer, State Road Department, Gainesville, Fla. and J. E. Walker, County Engineer, Marion county, Ocala, Fla.—WRUF, Gainesville; A. F. Annen, City Engineer, Hot Springs National Park—KTHS, Hot Springs National Park; C. P. Fortney, Chairman, State Road Commission, Charleston, W. Va., and H. McGraw, County Engineer, Brooke County, Wellsburg, W. Va. —WSAZ, Huntington; M. S. Murray, Director of Public Works, Kansas City, Mo. and T. H. Cutler, Chief Engineer, State Highway Department, Jefferson City—KMBC, Kansas City; E. E. Stansbery, Civil Engineer, Little Rock, Ark.—KLRA, Little Rock; T. B. Crutcher, former director of public works, Louisville, Ky. and H. D. Palmore, Chief Engineer, State Highway Commission, Frankfort—WHAS, Louisville; L. G. Smith, Director, State Highway Department, Montgomery, Ala., and W. W. Brandon, County Commissioner, Tuscaloosa county —WSFA, Montgomery; T. B. Oakley, Chief Engineer, Borough of Richmond, New York City, and Frank A. Peck, of

View of Some of the Exhibits at the 1930 Road Show of the American Road Builders Association

the United States Capital Corporation, New York City—WNYC, New York City; W. H. Ohmen, Chief Designing Engineer, San Francisco, Calif.—KROW, Oakland; L. A. Wilson, City Engineer of Rockford, Ill.—KFLV, Rockford; Robt. J. Brooks, Director of Streets and Sewers, St. Louis, and W. W. Horner, Chief Engineer, Sewers and Paving, St. Louis—KMOX, St. Louis; C. G. Gonter, Traffic Engineer, Department of Streets and Sewers, St. Louis—KWK, St. Louis; W. N. Carey, City Engineer, Department of Public Works, St. Paul, Minn., and C. M. Babcock, Commissioner of Highways, St. Paul—KSTP, St. Paul; E. L. Wortsman, former traffic engineer of Savannah, Ga.—WTOC, Savannah; E. B. Jeffress, Chairman, State Highway Commission, Raleigh, N. C.—WSJS, Winston-Salem; H. G. Sours, County Engineer, Summit County, Akron, O., and O. W. Merrell, Director of Highways, Columbus —WSPD, Toledo; A. W. Dean, Chief Engineer, State Department of Public Works, Boston, Mass., and L. O. Marden, County Engineer, Worcester County, Mass.—WBSO, Babson Park; C. E. Myers, Director of Transit, Philadelphia —WIP or WFAN, Philadelphia; C. E. Burleson, County Engineer, Pinellas County, Clearwater, Fla., and W. T. Williams, Chairman, Board of County Commissioners, Tampa—WFLA, Clearwater; G. W. Farny, Consulting Mining Engineer, Morris Plains, N. J.—WCDA, New York City; Harry W. Eustance, City Engineer, Ithaca, N. Y.—WEAI, Cornell University; Prof. R. A. Moyer, of the Engineering Division, Iowa State College—WOI, Iowa State College; Prof. D. M. Griffith, of the Department of Civil Engineering, Bucknell University, Lewisburg, Pa.—WJBU, Lewisburg; Prof. F. H. Eno, of the Department of Civil Engineering, Ohio State University, Columbus—WEAO, Ohio State University; Prof. M. W. Furr, of the Department of Civil Engineering, and Prof. C. H. Scholer, of the Department of Applied Mechanics, Kansas State Agricultural College—KSAC, Manhattan; D. L. Erickson, City Engineer, Lincoln, Neb.—WCAJ, Nebraska Wesleyan University; R. W. Hendry, Engineer, Highway Department, Territory of Hawaii, John H. Kangeter, Engineer, Hawaii Bureau of Governmental Research, H. A. R. Austin, Chief Engineer of the city and county of Honolulu, and V. B. Libbey, Plant Superintendent, Hawaiian Contracting Co.—station KGU, Honolulu, Hawaii.

State and County Highway Financing and Administration Studied

The administration and financial relationship of states and counties are being studied by a committee of the American Road Builders' Association. Results of the investigation will be presented at the 29th annual Convention and Road Show in Detroit, Jan. 11-15, 1932. The committee work is in charge of A. W. Brandt, State Highway Commissioner, Albany, N. Y., as chairman.

The committee will report on methods of administering and financing local highways now existing in the various states. The purpose is to recommend an administrative and financial structure that will result in the distribution of funds on a transportation system unhampered by political boundaries.

Other members of the committee are: Norman M. Blaney, director, Farm to Market Roads, American Farm Bureau Federation, Chicago, Ill.; Victor Brown, Associate Editor, ROADS AND STREETS, Chicago, Ill.; O. W. Merrell, Director, Ohio Department of Highways, Columbus, O.; and W. O. Washington, County Engineer, Cameron County, Brownsville, Tex.

Construction Committees Cooperate with Other Associations

By special arrangement with other national organizations the American Road Builders' Association is sponsoring reports on the construction of pavements and low cost surfaces.

The purpose of these activities is to bring to all road builders authoritative and timely information prepared by specialists. Engineers and others who prepare or use specifications for highway surfacing will find them particularly valuable.

Preparation of the reports is well under way, and upon completion they will be reviewed by impartial committees, whose membership have specific knowledge of each type of construction. The subjects included are:

Recent practical developments in design and construction of concrete highways.

Recent practical developments in design and construction of brick pavements.

Recent practical developments in design and construction of asphalt pavements.

Recent practical developments in design and construction of reinforced concrete pavements and bases.

Recent practical developments in design and construction of low cost road surfaces.

County Highway Work Developed by Road Builders

The county highway officials' division of the American Road Builders' Association will continue its activities to assist county officials in establishing and maintaining county highway work on the highest plane of usefulness, according to Chas. Grubb, Engineer-Executive. Its five general committees have selected subjects of practical importance relating to one or more of the nine points or special aims of the division: Favorable legislation; comprehensive plans coordinated with state plans; increased county programs; better business methods; competent supervision; standard construction; regular and systematic maintenance; complete publicity of county operations; and active cooperation with other official and unofficial agencies and associations promoting better roads.

The personnel of the committees is made up of experienced and well qualified county officials from all parts of the country, who act as individuals or as representatives of state associations of county officials. Their active participation gives assurance that the reports will contain conclusions of value to county officials generally.

Road Builders Study Design and Construction of City Pavements

The design and construction of city pavements has received the most careful study by the committee devoted to that subject in the city officials' division of the American Road Builders' Association, according to H. L. Shaner, Commissioner of Public Works, Winston-Salem, N. C., and chairman of the committee.

The specific details studied include:

A survey of the design of street railway track pavement used in 80 cities scattered geographically throughout the country and varying in population from 25,000 up, will be the basis for this portion of the report. Opinion as to adequacy is sharply divided between the rigid and non-rigid types of construction and the committee hopes to develop recommended designs for each type.

A careful correlation of research on contraction and expansion in pavement bases with recommendations will form a most instructive and interesting feature of the report.

Probably every city in the country, and particularly those which in recent years have experienced rapid growth, are faced with the problem of streets in residential areas which were surfaced with light pavements and which are now called upon to carry heavier traffic than that for which they were designed. A careful survey will be conducted to determine whether satisfactory methods have been developed for strengthening such pavements. Such methods would prove invaluable to city officials. If methods cannot be recommended as satisfactory, a city official would have the result of a careful survey to support his request for funds to replace the pavements.

The non-technical, informative report on subgrade problems which has been developed as a guide for the engineer in solving these problems will fill an urgent need in this field.

Other members of the committee are: H. F. Clemmer, Engineer of Tests and Materials, Engineer Department, District of Columbia, Washington, D. C.; C. L. Hawkins, Superintendent of Maintenance of Way, St. Louis Public Service Co., St. Louis, Mo.; H. C. McClure, Michigan Public Utilities Commission, Lansing, Mich.; R. H. Simpson, Chief Engineer, Department of Public Works, Columbus, O.; Nathan L. Smith, Highways Engineer, Baltimore, Md.; Bryson Vallas, Superintendent of Sewerage and Water Board, New Orleans, La.

New Equipment and Materials

New Small Shovel

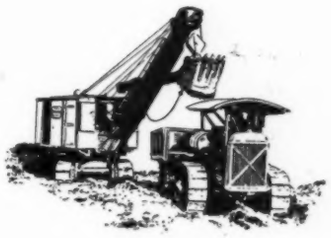
An 11 ft. capacity shovel, which is convertible to a back filler, trench hoe, drag line, crane or clamshell bucket service, has been brought out by the Austin-Western Road Machinery Co., Chicago, Ill. In this shovel, cut gearing enclosed and running in oil, with ball or roller bearings, all fully enclosed and sealed, are used at every moving point of consequence. The whole main frame assembly is reinforced and electrically welded into one strong, solid unit. The mast supporting structure, the dipper and other parts are similarly fabricated and carefully designed; all of which is calculated to reduce unnecessary weight and greatly increase strength.

The Austin Badger has full three-quarter swing of 270 deg., while the crawlers

The Austin Badger

are so geared and controlled independently, that the shovel can turn in its own length and be placed in the most favorable operating position in just a moment's time. The crawlers are exceptionally large and so well constructed that there will be practically no expense for maintenance on them during the life of the shovel, according to the manufacturers. They are a full 10 ft. 6 in. in length and measure 7 ft. 8 in. from outside in width, thus giving a very substantial base which, combined with the weight, forms a perfect counterbalance for the dipper at any angle at which it may be working. By virtue of the specially constructed curved boom, of improved design and better balance, coupled with longer dipper handles, the bucket has an exceptionally high lift.

Powered with a McCormick-Deering Model 20 Industrial unit, with a transmission having a number of speeds forward and one reverse, the Austin Badger can travel as high as 4 miles per hour. When traveling any considerable distance, however, a heavy rubber-tired portable truck arrangement is used—and only about 10 minutes (without extra tools or equipment) are needed for mounting or demounting the shovel. Truck mountings are very substantially made to handle the



load at high speed. The full power of the motor is made available for operation of the dipper through the "power take-off" in the transmission, which operates through gearing all enclosed and running in oil.

In addition to the foregoing, the shovel has the latest refinements, such as booster type clutches, readily renewable brakes, high pressure lubrication, etc., combined with easy accessibility to all parts.

Hercules Announces Crawl Tractor

The Hercules crawl tractor, the newest development of The Hercules Company, Marion, O., combines the fields of usefulness of a tractor and a road roller into one machine. In many cases, much of the time of a road roller is unproductive. After completing a rolling operation, the machine is required to remain idle until the progress of construction necessitates another rolling. It is to convert this idle period into productive time that the Hercules crawl tractor has been designed. This new tool fills the need of heavy construction and road contractors, and municipal, township, county and state highway departments for a machine that will reduce the capital investment required for two separate pieces of equipment and supply one unit with the utility of two.

The Hercules crawl tractor should find its economic place in the highway field in the construction of low cost roads. The convertible tractor feature of the Hercules roller expands the usefulness of the roller so that the same unit may be used as the primary power for surfacing and finishing operations, thus employing what would otherwise be idle roller time. For all operaitons, from scarifying the old surface to the finished rolling of the completed job, this one unit can effectively handle the power requirements on low cost road work. This feature should tend to lower unit construction costs thus enabling more mileage to be built for the safe funds.

Each rear crawler belt is free to rotate on its axle independently of the other crawler. This permits the machine to obtain maximum tractive effort because each crawler conforms to the contour of the ground over which it operates. Combined with the gyroscopically mounted front roller, a three point suspension is obtained that further contributes to the ability of the unit to operate over uneven ground.

The Hercules crawl tractor is a standard Model 60, 80 or 100 Hercules chassis mounted on two rugged crawler trucks. These crawler trucks fit all Model 60, 80 and 100 Hercules road rollers, including those now in service. Anti-friction bearings have been freely employed in the construction of the Hercules chassis, and in keeping with this progressive standard, the crawler trucks are mounted in ball and roller bearings. All that is necessary to convert the Hercules crawl tractor into a Hercules roller is to jack up the rear end, take off the crawler trucks and replace the roller wheels. The powerful Hercules scarifier can be used with either roller or tractor equipment.

Dynamometer tests made at the factory showed that the Model 60 crawl tractor develops a draw bar pull of 8,000 to 10,000 lb., which may be increased for special work. The draw bar pull of the Model 80 and 100 is greater in proportion.

All models have three speeds forward

Model 60 Hercules Crawl Tractor

and backward. Motion either way is controlled by the movement of a single operating lever. The standard Hercules tractor has a speed of ½ mph. in low, 1½ mph. in second and 2½ mph. in high. These speeds may be increased or decreased to meet special operating conditions. As a roller the standard Hercules travels 1½, 3½ and 5½ mph. in low, second and high gears respectively. All models of Hercules crawl tractors are powered by a standard nationally known 6-cylinder engine.

The Hercules crawl tractor has a wide range of usefulness for a single unit of heavy machinery. Hauling earth or rock, handling a bulldozer or a scarifier, drawing a pull grader, plow, draw scraper, hauling large diameter pipe for oil pipe lines, hauling heavy timber and dragging cables through underground conduits are but a few of the many uses for this machine.

The research experimental work and preliminary trials have been conducted and completed at the Hercules factory. The perfected unit is now in production for delivery to the Hercules distributor organization.

New Rex Moto-Mixer Is Equipped with a Hoist

A new hoist for truck mixers, called the Jackass Hoist, has been developed by the Chain Belt Co. for their line of Rex moto-mixers and moto-agitators.

This new hoist arrangement raises the mixer 8 ft. from the ground for a greater delivery and spouting range. The hoist was developed with the co-operation of the Heil Co. of Milwaukee, manufacturers of the Heil hoist. It is a hydraulic hoist fitted to the rear end of the truck chassis and raises the discharge end of the mixer just like a Jackass raises his heels to kick. The Heil hoist used has been especially designed for this mixing unit. The lifting effort is exerted directly against the load to raise the drum the desired height.

From the height of 8 ft., it is stated, the concrete can be spouted over an area approximately 75 per cent greater than heretofore. The hoist raises the drum high enough to discharge into a 3-yd. hopper. The flow of concrete can be regulated easily by the operator from a slow trickle to a full discharge by a simple turn of a handwheel. Though the mixer is raised at a considerable angle, the drum empties itself cleanly and thoroughly.

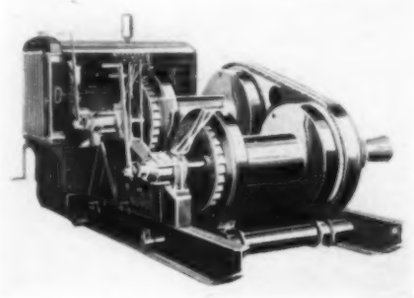
Rex Truck Mixer with Hoist

New Heavy Duty Hoist

A new double drum, anti-friction, heavy duty hoist has just been placed on the market by the Novo Engine Co., Lansing, Mich. These Model RH hoists are built in the single, double and triple drum types, powered with electric motors or gasoline engines.

The hoist is equipped with anti-friction bearings throughout. The drum, idler and intermediate shaft are equipped with self-aligning roller bearings, which are capable of carrying radial and thrust loads. Each drum is carried on two large diameter roller bearings. A large diameter roller thrust bearing is placed between the drum shifter screw and the shifter rod.

The side frames are electrically welded structural steel, welded integral with the base. The base is formed of two steel I-beams turned up and welded on each end to form skids. Welded-in 6-in. tubular spreaders are used between the sides of the base for strength. Three spreaders are used on the single and two drum hoists and four on the triple drum.



New Novo Hoist

The power drive is transmitted by a quadruple 1-in. pitch roller chain in a case, and is located on the opposite side from the operator. The power units are 75 to 100 hp. electric motors or gasoline engines.

The hoists have a capacity of 6 to 8 tons on a single line.

Link-Belt Announces New Shovel-Crane-Dragline

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill., have just announced the addition of a new shovel-crane-dragline, known as the K-48, to their line, which ranges from ¾ to 2½ cu. yd. capacity.

The Link-Belt K-48 is an all purpose unit, serving as a shovel, a crane, a trench hoe or a dragline. It can be furnished with any or all of the attachments which are usually only available on smaller machines. The K-48 is arranged for gasoline engine, Diesel engine, or electric motor drive. The gasoline engine has a heavy duty 130 hp. rating and the Diesel engine or electric motor is of corresponding capacity. As a shovel, it is standardly equipped with a 25 ft. shovel boom, 17 ft. 6 in. dipper stick, and a 1¾ cu. yd. dipper.

Link-Belt K-48 Independent Chain Crowd Shovel

As a crane, the K-48 has unusually large rated lifting capacities, all of these have a very liberal margin against tipping, this margin being 33 1/3 per cent or more. It has a rated capacity of 32 tons at 12 ft 0 in. radius and 10,400 lb. at 45 ft. radius on a 45 ft. boom, and corresponding capacities at other radii and for other boom lengths.

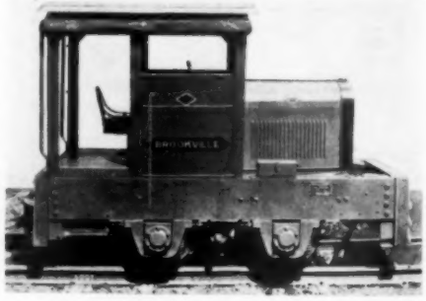
As a dragline, it will handle 1¾ cu. yd. heavy or 2 cu. yd. light-medium bucket on a 45 ft. boom, and a 1½ cu. yd. heavy or 1¾ cu. yd. light-medium bucket on a 50 ft. boom, with the boom at any angle convenient for dragline work. It is necessary to work with a "high" boom or at limited radius to handle these loads, as these are conservative ratings which the machine will easily and safely handle.

As a trench hoe, the character of the work and the digging depth determine the size of the bucket used. For normal digging depth, in average soils, a 2 cu. yd. solid-bottom bucket is standard.

K-48's design includes: large, ample, slow-wearing crawler rollers; husky, self-cleaning crawler treads; large ring gear and roller path; unit cast steel construction throughout; and large drums, clutches and brakes.

New Brookville Locomotive

A new and improved locomotive with Ford Model "AA" power plant has been brought out by the Brookville Locomotive Co., Brookville, Pa. The models are offered in 2, 2½, 3, 3½ and 4 tons weight for any gauge of track. The features of construction include the fol-



New Model Brookville Locomotive

lowing: Dual spring journal wheel suspension, permitting use over rough, crooked tracks; steel tires, providing 25 per cent greater traction; four speed reverse, providing four speeds in either direction, up to 16 miles per hour. The Brookville gear reverse employs high grade spiral bevel gears, Timken bearing equipped and operating under an oil bath in a dust-proof housing; governor control to protect motor; air cleaner for carburetor; Timken bearings at wheel journals and in the reverse gearing; three pocket link and pin coupler; self starter; half length steel cab, newly designed, of sturdy heavy gauge sheet steel construction supported by steel angles and fitted with roll curtains for full enclosure.

Hoist Attachment for Truck Mixers

A rear lift hoist attachment for truck mixers for use where job conditions make extra discharge height desirable has been brought out by the Jaeger Machine Co., Columbus, O.

The single, positive hoist, with double support which eliminates all possibility of body sway, makes possible an 8 ft. total elevation of the discharge end of the

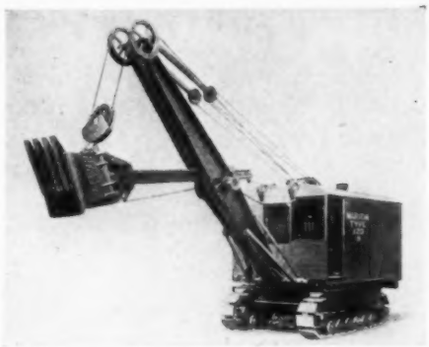
Jaeger Rear-Lift Hoist Attachment

mixer. The spouting area over which concrete may be chuted is stated to be increased by 75 per cent. The hoist mechanism is manufactured by Gar Wood, of Detroit, Mich. The attachment can readily be mounted on any standard type of truck, which is equipped with power take-off to drive the hoisting mechanism.

Jaeger Truck Mixers or Agitators can be equipped with rear-lift hoist attachment either at the factory or in the field. Hoist frame alone adds 15 in. to usual discharge height with body down; with body tilted to maximum it increases this height an additional 30 in. (45 in. total).

Marion Brings Out New ½-Cu. Yd. Gas Shovel

The Marion Steam Shovel Co., Marion, O., has brought out a new ½-cu. yd. shovel, dragline, clamshell and crane, named "Type 120." Type 120 is a gas machine designed for small general excavating and material handling work. The new model, states J. H. Watters,



New Marion ½-yd. Gas Power Shovel

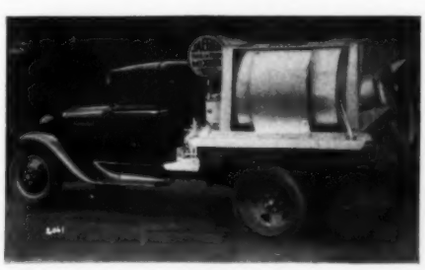
President of The Marion Steam Shovel Co., is constructed with the same engineering thought, the same quality of material and the same workmanship characteristic of all other Marions from the 1¼-cu. yd. gas or Diesel-electric to its largest machines. And it will be sold and serviced by the regular Marion organization.

The new shovel is stated to be fast and mobile, simple to a high degree and thoroughly accessible. It has the fewest number of parts possible. The new shovel is stated to also incorporate a number of unique features, including a rotating gear as large as the overall width of the crawlers, centralized machinery mounting, ball-bearing roller path, and high ground clearance combined with unusual compactness. Type 120 has a dipper capacity of ½ cu. yd.; a boom length of 18 ft. 6 in.; dipper handle length 11 ft. 10 in.; dumping height 12 ft. 7 in. and dumping radius, 20 ft. 0 in. The working weight approximately 42,000 lb.

New Truck Mixer

A separate engine drive 1-1½ yd. capacity truck mixer, or 2 cu. yd. agitator unit has been added to the truck mixer line of the Jaeger Machine Co., Columbus, O. The mixer has a 55 in. diameter drum of 90 cu. ft. total volume. It is equipped with the Jaeger spiral mixing blades giving the dual mix action.

The separate engine drive unit is a 10 h.p. 4-cylinder radiator cooled engine with starter for hook-up to truck battery. Standard equipment includes 6-ft. aluminum chute for easy handling—controls for throttle, and full control of drum are



Jaeger 1½-yd. Separate Engine Drive Truck Mixer

grouped at discharge end of machine, as well as at engine end.

New Vibrating Screen for Bucket Loader

A new 3-product vibrating screen for use with its Model 62 heavy duty self-feeding bucket loader has been introduced by the Barber-Greene Co. of Aurora, Ill. The screen is designed for operation in gravel pits, in coke plants, on road jobs, or in any place where bulk material must be classified by size. It is stated that the screen will take gravel direct from the bank in a pit and load it out as oversize, gravel, and plaster sand; or it will take coke as it comes from the oven and separate it into furnace coke and nut coke, at the same time cleaning out the breeze. When such a fine classification of gravel or coke is not desired, the screen may be made into a 2-product unit by removing one screen cloth.

The new screen is made up of two screen cloths vibrated at 1,200 v.p.m. by an alloy steel eccentric shaft driven by a power takeoff direct from the main transmission of the loader. A belt that can be easily removed and rethreaded

Barber-Greene Vibrating Screen on Bucket Loader

transmits the power to the screen. This belt is provided with an automatic takeup to compensate for stretch or contraction. The entire screen frame is vibrated in the center and cushioned on each end, and is counterbalanced so that no vibration is carried back to the loader frame.

Material discharged from the buckets of the loader falls first on a large mesh screen cloth which removes oversize, carrying it off over a steel chute. Shaken through the first screen, the material drops on a finer mesh below. The very finest size falls through this cloth onto a rubber belt conveyor which carries it out and discharges it at a point 9 ft. from the center of the machine, while that which remains on the second screen passes off over a chute directly in back of the loader. In this way, two trucks may be loaded at the same time. Screen cloths are provided in sizes to suit the individual user's need.

The whole B-G Vibrating Screen is so mounted that it may be lowered to allow

the loader boom to be rolled back for traveling, and raised to position again by a hand hoist. Either loader or screen may be operated independent of the other.

The Model 62 Loader on which the screen is mounted was announced some time ago. It is the largest of the four sizes of B-G loaders, being self-feeding, self-propelled, and is stated to be capable of loading at the rate of 2 cu. yd. a minute. Two patented safety sprockets, one on the bucket line and one on the crawler drive, safeguard it against injuries due to overcrowding.

New Haiss Loader

A new high powered loader has been brought out by the George Haiss Manufacturing Co., Inc., 141st St. and Park Ave., New York, N. Y. This new Haiss Model 80 Loader is stated to have demonstrated an average capacity in excess of 3 cu. yd. per minute.

The new Haiss 80 is equipped with a 60 H.P. 6-cylinder engine, with intake air cleaner, oil filter, gasoline strainer and inbuilt throttling governor. It has a fully enclosed transmission, all gears running in oil. It has the patented Haiss 3 ft. per min. crowding speed, and the Haiss patented revolving propeller feeding device. The buckets, measuring 22 in. x 12 in. x 10 in. are toothed for easier digging. The bucket elevator is interchangable with a flight-conveyor snow boom for winter snow loading.

The weight of this new machine is 16,500 lb. Manganese steel is used at vital parts to assure lowest maintenance and replacement cost. This is a standard practice of the Haiss engineers.

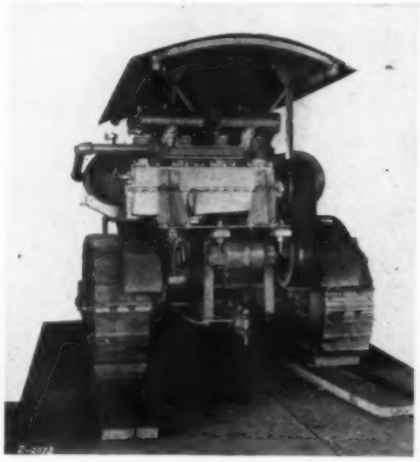
Despite its great size and large capacity, the Model 80 is stated to be exceptionally easy to operate. There are only six controls in all. Each motion requires only one hand-movement. A skilled operator is not required; in fact, a few hours experience is said to assure fullest efficiency.

Haiss Model 80 Loader

Davey Compressor Mounted on Caterpillar Sixty

One of the latest developments in Davey "air-cooled" portable air compressors is the 310 cu. ft. unit for mounting on the "Caterpillar" Sixty Tractor, as shown in the accompanying illustration.

The compressor unit of the Davey Compressor Co., Kent, O., is the regular 310 cu. ft. 4-cylinder Davey "air-cooled" air compressor. The mounting consists of steel extensions which bolt to tractor frame out of the way at the rear. This mounting and location does not interfere with normal draw-bar operation of the tractor; the light weight of compressor and mounting, only 1,800 lb., does not interfere with tractor balance or pressure on the treads.

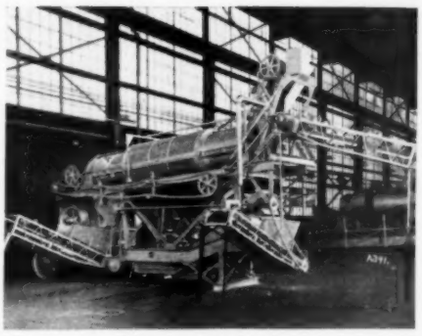


Davey Compressor Mounted on Caterpillar Sixty Tractor

Compressor drive is through 5 V-belts and the standard "Caterpillar" stationary drive which embodies a clutch. The cushioning effect of this drive absorbs the pulsating compressor torque, and eliminates any possible undue wear or strain on the tractor mechanism. This driving arrangement also permits the Compressor to be started or stopped instantly by a slight movement of the conveniently located clutch lever.

Combination Washing, Screening and Crushing Plant

A combination portable washing, screening and crushing plant is the latest addition to the line of the Iowa Manufacturing Co., Cedar Rapids, Ia. The screen is 42 in. diameter by 12 ft. long, bevel gear and pinion drive, revolving on cast steel trunnions and mounted on I-beam frames. Dust jacket is 54 in. diameter by 8 ft. with wire cloth sectional frames. The scrubber is 42 in. diameter by 4 ft. long with series of angle iron paddles and water collars inside to perfect washing operation. Scrubber is attached directly to screen and operates as integral part. The sand settling tank is of the drag scraper type, 32 in. wide with 25 cu. yd. per hour capacity. The paddles are mounted on special wear resisting manganese steel chain. The elevator is 14 in. by 7 in. Style AA, reinforced malleable buckets mounted on S102B, all steel chain. Elevator telescoping type to permit raising for moving. The sand conveyor is 40 ft. by 14 in.; standard sectional conveyor, all welded type construction with 4 ply $\frac{1}{16}$ in. by $\frac{3}{32}$ in. conveyor belt. The feed conveyor is 40 ft. by 24 in.; standard sectional conveyor same construction as sand conveyor with 5 ply—$\frac{1}{8}$ in. by $\frac{1}{16}$ in. conveyor belt. Clutch mounted on head end section for cutting off feed and to clear plant. The delivery conveyor is 40 ft. by 18 in.; standard sectional conveyor, same construction as sand and feed conveyors with 4 ply—$\frac{1}{16}$ in. by $\frac{3}{32}$ in. conveyor belt. The crusher is the standard 9 in. by 36 in. Cedar Rapids crusher.

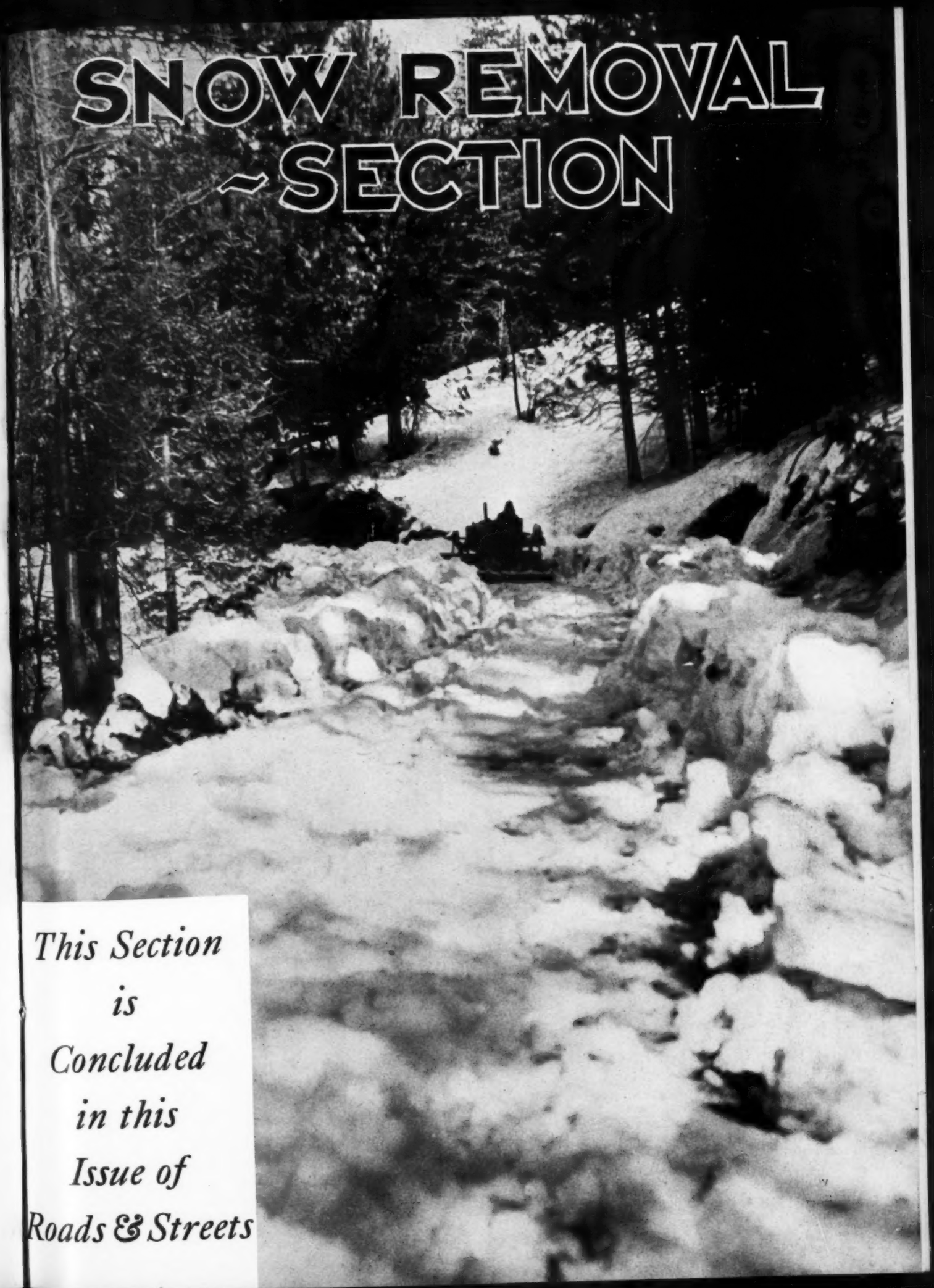


Cedar Rapids Portable Washing, Screening and Crushing Plant

All drives are driven from crusher flywheel. Crusher is driven off flywheel by central power plant. Clutch mounted on first countershaft from crusher permits stopping of entire plant except crusher. This clutch is also designed for the purpose of starting the crusher first and then engaging the balance of the plant when the crusher is up to speed. All chains are steel type roller chains and sprockets are chilled rim type which prolongs life of both sprockets and chains by reducing wear to minimum.

The frame is made of 12 in. I-beams, rigidly constructed with 36 in. diameter by 12 in. face. They are all steel indestructible rear wheels and 30 in. diameter by 10 in. face front wheels. Front axle is 3 in. square special axle steel, rear axle 3½ in. square, same specification. Wheels are roller type. Overall dimensions of truck unit less conveyors: Length: 25 ft., width 8 ft., height 18 ft. (to top of elevator from ground line), weight 48,000 lb. Complete plant including all conveyors and truck unit.

SNOW REMOVAL SECTION



This Section is Concluded in this Issue of Roads & Streets

The Sun That Brief ~~November~~ March Day Rose Cheerless Over Hills Of Gray

Apologies to Whittier's "Snow Bound"

By NELLIE OKEY MINK
Assistant County Highway Commissioner, Grant County, Wisconsin

SITTING by the fireside reading Whittier's "Snow Bound" is a different proposition than being a county highway commissioner in Grant County, Wisconsin, when a storm which begins in the gloaming and steadily all the night is covering fields and meadows with a radiance pure and white. If it would only stay on the fields and meadows, it would be all right, but when the second morning shines, we look upon a world unknown. For every state, county and town highway was packed full and now comes the great problem of opening them for traffic.

The two big Best 60's which have been kept in readiness are hastily filled with gasoline, one carrying a Wausau plow and the other a Baker, are soon out nosing their way through the almost immovable drifts.

Mountains of Snow on Roads Around Lancaster, Wisconsin

Now here comes the "Sno Go," the most interesting of snow removal equipment, grinding up ice, wet snow, or any kind and blowing it clear out of the way over into the fields. Though it makes only an eight foot cut it travels so much faster than the big tractors it will double back and make a sixteen foot cut in less time than the tractors can push through and open up a path fifteen feet wide.

Where the drifts are not so deep, we send out the G. M. C. truck with a blade attached that does very effective work and covers lots of territory.

Grant County has over five hundred and twenty miles of state and county trunk lines and with the meager equipment aforementioned, has an almost insurmountable problem on its hands when the snow comes, as it did March 30, 1931. Drifts pile up ten to twelve feet in depth, wet and heavy, and the ground becomes soft beneath so that the machinery cannot work to the best advantage. The great question then arises, "Where shall we go first?" Serious illness calls for assistance. The mails cannot get through and what is so important (to some) as their daily paper? High School and Teacher's College students cannot reach their work, and it's examination day and they telephone frantically that they *must* get through.

The county nurse's schedule is upset. Country schools are closed. The doctors are besieged with calls. Why is it that patients are always worse at night or when the roads are impassable?

One good man called repeatedly to know how soon his road would be open for travel; wanted to know why they should be kept waiting so long, etc., etc. It later developed that his wife was due at a "dinner party" and she had to miss it or go by team and sled, in "the good old fashioned way."

The telephone rings incessantly, each one stressing

Snow Drifts, Almost Tunnels, on County Roads in Grant County, Wisconsin

the importance of his road; in fact, the office assistant answered calls one day almost steadily for eighteen hours.

The boys with the plows worked day and night. Sometimes they were invited in for hot coffee and lunch but often they had to drive back around the way the plows had gone to reach home, food, dry clothes, and rest.

The gasoline trucks follow along, bring supplies of gas and oil and also bring new crews to take over the next shift.

And though it is a hard task the boys revel in it. They love conquering the big drifts. Oftentimes the farmers along the way come out with their shovels and lend their assistance where the plows simply cannot get through.

We have thirty thousand feet of snow fence placed as advantageously as possible, which is a great help but very inadequate for our mileage.

Fences, covered with brush, weeds and tangled vines are picturesque and wonderful nesting places for birds

and other wild life but Oh!, what it does when the snow storm comes and the winds blow and the drifts pile higher and higher in the highways.

We are hoping for more funds, more snow fence, more equipment, and less snow all at one time.

Grant County had an unusual amount of snow last year, far more than many of the northern counties, but we realize now what a great benefit it was to us by the moisture left in the ground, which helped us through one of the hottest, driest summers we have ever experienced.

▼

Snow Removal In Philadelphia

By A. M. SOBEY

Chief, Bureau of Street Cleaning, Philadelphia, Pa.

SNOW is removed entirely from the central section of the City of Philadelphia, from principal traffic streets, and from main intersections in outlying sections of the city. Philadelphia has been very fortunate in late years in regard to snow storms. The last snow of sufficient depth to be removed was in February, 1929. The removal of snow is one of the problems of the Bureau of Street Cleaning.

Snow is cleaned from footway crossings, and from around fire hydrants, inlets and car stops; this work being done by the regular forces of the bureau. Streets and roads in outlying sections of the city are plowed by the Bureau of Highways.

Prior to 1927 the snow removal plans and methods were changed each year, but in the fall of 1927 a plan was decided on that has been in force since that time. It was decided at that time that small snow removal districts could be worked to better advantage than the large ones then in use.

The central section was divided into 140 districts, each being numbered in the order of their importance. These 140 districts have a total street length of 45 miles and an approximate area of 1,200,000 sq. yd.

Organization.—Any organization for snow removal must be prepared for instant action and is comparable to a fire department. By our plan everything is ready before the advent of the first snow. The superintendent in charge of snow removal makes lists of all employees available for snow work with their addresses, day and night telephone numbers and police districts. All contractors equipped to do snow work have a questionnaire sent to them which they return to the Bureau of Street Cleaning stating their willingness to be called on for this work, agreeing to the city's price per truck and man, stating the number of trucks and men that they can provide.

Method of Operation.—Plows are owned by the bureau and are attached to bureau flushers and trucks. As soon as snow is of sufficient depth to plow the plows start to work plowing from the center of the street toward the curb. The city forces in the central section are called out to keep crossings and inlets open. During many storms in Philadelphia after several inches of snow have fallen the snow suddenly turns to rain, and the bureau must be on the watch for this condition so that the streets do not become flooded due to windrows blocking the mouth of the inlets.

The snow superintendent keeps in touch with the weather bureau, and as soon as the storm appears to be of any size, he calls out the contractors. The bureau owns several thousand scoop shovels which are lent to the contractors at no cost to them except for the ones lost. As the contractors report for work they are assigned to districts in the order of their arrival. The first to arrive work in District No. 1 and so on. As a district is finished that contractor is given the next available one that has not been started.

When the central section has been cleaned the contractors are sent out to the principal traffic streets and main intersections in outlying sections.

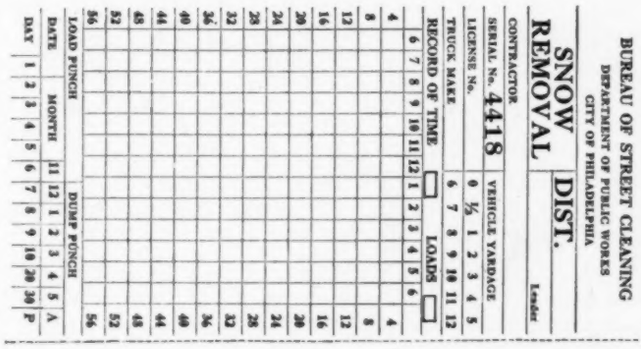
There is an inspector assigned to each contractor. He is furnished by the superintendent in charge with a set of instructions, tickets, punches and checks. For each truck there is a duplicate ticket made out showing make and size of truck, license number, time starting and stopping, and number of loads. At the end of the day's work the contractor is given one-half of the ticket and the other half is turned in to the bureau. A facsimile of this card is shown herewith.

The inspector gives each laborer a check made of cardboard with a metal edge. Each snow storm a different color of check is used. The laborers' numbers are entered in a small note book showing time of starting and stopping. These checks are collected at the end of the day's work. Most of the contractors pay the men at the end of each day's or night's work. Each district is limited to 15 trucks and 60 men. If a contractor can furnish more than 15 trucks he is given two districts.

Dumps.—The central section is between the Delaware and Schuylkill Rivers and snow is dumped into these rivers. There are several points along the Delaware where snow can be dumped right from the street. Many of these dumps get clogged up and clam shell buckets are used to throw the snow overboard.

The Market Street bridge over the Schuylkill River is fitted with snow holes in the footway and snow is dumped through these into the river.

The city has several special snow holes in the street


BUREAU OF STREET CLEANING
DEPARTMENT OF PUBLIC WORKS
CITY OF PHILADELPHIA

SNOW REMOVAL — DIST. — Leader

CONTRACTOR

SERIAL No. 4418

LICENSE No.

TRUCK MAKE

VEHICLE YARDAGE 0 ½ 1 2 3 4 5 6 7 8 9 10 11 12

RECORD OF TIME 6 7 8 9 10 11 12 1 2 3 4 5 6

LOADS

DAY 1 2 3 4 5 6 7 8 9 10 20 30 P

DATE MONTH 11 12 1 2 3 4 5 A

LOAD PUNCH 56 52 48 44 40 36 32 28 24 20 16 12 8 4

DUMP PUNCH 56 52 48 44 40 36 32 28 24 20 16 12 8 4

Snow Contractors must obtain one of these tickets for each vehicle at Room 334 City Hall, if engaged upon force account, or from the Squad Leader, if engaged on contract work.

The driver must make sure that the ticket is punched by the inspector when the vehicle is loaded; also when it is dumped.

Leave duplicate copy of ticket with inspector in charge, before leaving the district.

DON'T LOSE THIS TICKET

Facsimile of Record Ticket Used in Philadelphia. Above—Front; Below—Back

containing main sewers but these are no longer used except when the Market Street bridge becomes jammed with traffic.

The Bureau of Street Cleaning cooperates with the Street Railway and Bus Company so that there are as few delays as possible.

The Bureau of Police has traffic officers stationed in the office of the Bureau of Street Cleaning who go out when any traffic interruption is reported so as to keep vehicles moving as quickly as possible under the circumstances.

While the work of snow removal is in progress, the other functions of the bureau, including the collection of ashes, rubbish and garbage, are carried on without interruption.

Chemicals.—Chemical methods of snow removal are often proposed, and in recent years this method has come to the fore.

In December, 1929, a snow melting solvent was demonstrated in Philadelphia. The snow was then four days old and had been compacted and frozen. The temperature while the test was being made was 35 deg. The solvent was dissolved in water in a 2,000-gal. flusher and sprayed on to the snow by means of small nozzles.

The test showed that the solvent had possibilities if used on freshly fallen snow, the bureau purchased a supply of the solvent, but has had no snow of sufficient depth to try it, since the solvent was delivered.

The street railway company sprinkles salt along their bus routes. This is successful in removing small layers of snow left after the street has been plowed, but it causes a white slush which splashes motor cars and pedestrians as motor cars speed by.

▼

Contrary to Custom

By L. F. LEVIN

County Engineer, Chippewa County, Michigan

SNOW removal for wheel traffic has definitely passed the stage where there is any question as to its advisability. Not so long ago the papers were full of the so-called excessive costs of this privilege to motorists, and many cheap expedients were suggested. Apparently now those most opposed to it, are its strongest advocates. It does maintain and speed up business volume.

Chippewa County, Michigan, has from 80 to 100 inches of snow fall, which as those who have the knowledge are aware, is not in itself a criterion of the volume of work involved in its removal. Considering each side of the road, or in other words double of our actual road mileage we find that 54 per cent of it is windswept, while only 16 per cent of it is protected by snow fence. The whole story is wrapped up in these facts. Wind swept snow is the major problem, and money spent in preventing the accumulation of this wind driven snow, saves dollars in removal later, and possible loss of life due to stalled traffic during the period of intensive storm.

The method in use here is to operate 3½-ton 2-wheel drive trucks equipped with V-plows during the period of the storm. The banks thus created are removed at the first opportunity, which is often during a lull in the storm, by the use of bank sweepers which pull the snow into the path of the rotary instead of shoving it

Banks as They Used to Be When Method Was to Push Snow Out Further Toward the Fence With Each Successive Storm

out as is so often the method. By bringing the snow in the rotary operates on a hard road, and banks are not built up at the fence line to be a menace along toward Spring.

Bank Slicer Pulling in Banks for Rotary Removes Snow So It Never Returns

By this simple change in procedure we have been able to maintain our roads at all times in a territory where 3 years ago, continuous snow banks existed 8 to 10 feet deep, without interruption for 22 miles.

▼

Benefits of Highways

In a recent address before highway engineers and officials at Madison, Wis., Dr. Glenn Frank summarized in the five following statements the more beneficial of the numerous results directly attributable to the highway engineers' work:

1. Saved rural communities from the isolation that starves men's souls and shrivels their spirits.
2. Reduced the narrow provincialism of American towns and cities by linking them up with other towns and cities.
3. Rendered the parcel post service possible.
4. Made possible a reduction in the cost of getting farm products to, and finished products from, railroad shipping points.
5. Made the educational and cultural influences of America available to wider and wider areas.

Remarks Regarding Snow Removal

Light Side of Weighty Subject

Miami Beach, Florida,
August 28, 1931

Gentlemen:

Kindly pardon my delay in replying to your request as to our methods of removing snow from our streets. I thought that you would probably want a complete history of this problem and it was necessary that I obtain a report from J. Hammerhead Greeby, one of our oldest citizens, a man who was one of the first pioneers here. I found him in his suite of offices in the Roosevelt Hotel, at which time he was very busy working on a plan to relieve the country from the depression, and also on a plan to drain the Everglades. At the moment I called on him he was busy on the investigation of the location of ice houses which would store ice obtained from the drainage ditches. He was also compiling statistics to determine the feasibility of growing forests of maple, walnut, fir and redwood trees. He said, "When this plan is finished, the Everglades will be second to none in scenic beauty. The snow covered hills of Alaska, the canyons of Colorado, the Black Hills of the Dakotas will all seem like the Gas House District as compared with our Everglades," and this busy man gladly furnished me with the information needed to complete the following report:

The worst snow storm in the history of the town was in 1898, occurring in September. This appears to you no doubt to be a strange month in which to have a snow. It was caused by a tropical disturbance commonly known as a hurricane. The winds of a hurricane whirl like an electric fan and on this principle cool the atmosphere. The greater the intensity the lower the temperature. The first part of the storm was spent in gradually cooling the atmosphere so that when the second part came it was so cold that the rain turned to sleet and hail and then snow. It lasted fourteen hours, and we had a veritable blizzard. The hail was as large as onions and the snow covered streets to an average depth of two feet. This storm also explains the reason that palm trees lean to the west here. The wind blew from the east and kept the snow in the palm trees towards the westerly side overweighting this side and caused them to bend.

We have had many snow storms since then, all caused by hurricanes. We do take advantage of snow and to us it is welcome, as we profit by it. As it is warm here all the year 'round the only way we used to get ice before the day of the refrigerator was to have it shipped in from Cuba. We now have a fleet of Earthworm Tractors, sold to us by Mr. Botts of that company, no doubt you have read his sales articles in the leading magazines, and also a large fleet of sprinkling wagons which are hauled by the tractors, which wet the snow in layers and cause it to become ice. After the storm ceases, the ice companies purchase the rights from us on a cubic yardage basis, cut the ice, haul it away, and store it for future use.

Trusting this is the information you desire, I will be glad to give you my opinion on any subject, and Mr. Greeby states that he will gladly give his ideas on any scientific problem as soon as he is finished with his theory of "relations, why they are and how."

Yours very truly,
HOTSEY CUT ICE.

P. S. I'll bet California can't beat this.

•

Mesa, Arizona,
August 25th, 1931.

Gentlemen:

Replying to your letter regarding snow removal, I beg to advise you that your request was somewhat of a shock, in that snow is an unknown quantity not only within this city, but the entire County of Maricopa. While you folks are wearing heavy red flannels, we are enjoying "summer" weather; playing golf, picking oranges, grapefruit, etc. Even a light film of ice is practically unheard of in the winter in this locality, and absolutely so insofar as the Chambers of Commerce are concerned.

Seriously, however, I appreciate your inquiry, and trust that later on I may be able to furnish material more suitable for this climate, and of interest to your readers.

Very sincerely yours,
S. M. MORSE,
Engineer, City of Mesa, Arizona.

•

Laredo, Texas.

Dear Sir:

As you may guess, there are no snow problems in this part of the world. However, we did have a six inch fall along the first of January, 1926, or the latter part of December, 1925. I believe we would just about have been mobbed had we tried to hurry its disappearance.

Your very truly,
FRANK C. HEINS,
City Engineer.

•

Vacaville, Calif.

Dear Sir:

When snow flies in California we declare a holiday and proceed to enjoy it. You might put your San Francisco agent wise to the fact that California has no snow removal problems. I am surprised that you ever maintained such a slanderous thought.

Yours truly,
F. A. STEIGER,
County Surveyor.

•

Duquesne, Pa.

Dear Sir:

We do not have any phase of snow removal or winter maintenance of highways that I believe would be of special interest to your readers. We do not have enough snow fall to require street sweeping. This city only has about 44.8 miles of streets, 25 miles of which are improved.

Yours very truly,
R. B. DELL,
City Engineer.

Brawley, Calif.

Dear Sir:

We use street flushers and brooms to keep our dust down.

C. J. PARK,
City Engineer,

▾

Spartanburg, S. C.

Dear Sirs:

Our snows are too light and infrequent to warrant mention. Sometimes none, sometimes one and occasionally two or more light snows, that can be removed by putting in wind rows with road machines, then hauling off after loading with chain gang and shovels. Sometimes a fire hose cleans a street at a congested place. Once or twice we have put out salt at dangerous places where the heavy traffic compressed the snow into ice.

Yours truly,
D. G. ADAMS,
City Engineer.

▾

Fort Smith, Ark.

Dear Sir:

I have been in Fort Smith for 23 years. In that time we have had two snows which were deep enough to be of some inconvenience. One of these nature removed about as quick as forces could be gotten out to remove it, and the other froze and was such a novelty that it was nicer to kep it for the sake of variety than to have it removed. Some winters the fall is so slight that most people do not even trouble to sweep it off the sidewalk.

Your very truly,
H. S. PECK,
City Engineer.

▾

Elizabethtown, Pa.

Gentlemen:

Replying to the above request I wish to say that in my work I have had no particular connection with the class of work mentioned. My experience in that class of engineering has been somewhat limited.

Snow as an element of engineering in this town does not amount to anything worth mentioning.

Yours truly,
HENRY L. GISE,

▾

Miami, Fla.

Gentlemen:

Our Department of Public Service has referred your letter of August 19th to this office with an explanation that they are totally ignorant of the intricacies of the problem that you present.

At the risk of a complete break-down of our efficiency we must add our confession of inexperience and present our mid-winter street problems in the only medium at our command—the enclosed illustrated booklet!

Please treat our stupidity kindly and accept our best wishes for a successful issue of ROADS AND STREETS with the assurance that we shall be interested readers.

Cordially,
D. C. COLEMAN,
City Manager.
City Engineer.

Charleston, S. C.

Dear Sir:

In reply to your inquiry concerning snow removal I doubt if I can send you anything of interest.

In the past thirty-six years we have had snow on three occasions, I think, twice just enough to whiten the pavement and once enough to make snowballs on a small scale. Snow removal is not a problem here.

Your very truly,
J. H. DINGLE,
City Engineer.

▾

Ravenna, Ohio.

Dear Sir:

Our city does not go in for snow removal on an extensive scale. We use Calcium Chloride at "stop" streets to cut down the danger of skidding.

The only snow we haul off is that that the merchants sweep off their sidewalks and pile in the gutters.

Your very truly,
P. C. SHAFER,
Director of Public Service.

▾

Beaver Falls, Pa.

Dear Sir:

In reply to your letter, will say that no snow removal records or methods are employed in this town, as we do not lie in the snowy regions of the country.

Yours truly,
IVAN P. LINDEMAN,
City Engineer.

▾

Pontiac, Mich.

Dear Sir:

In reply to your letter I wish to state that we are not in a position to write on snow removal in the City of Pontiac which would be of interest and value to other municipal engineers. Our records have not been kept in such a condition that we could make accurate statements as to the cost or amount of snow removed.

Very truly yours,
HERBERT A. OLSON,
City Engineer.

▾

Zanesville, Ohio.

Gentlemen:

This office does not have charge of snow removal work, it being taken care of by our Street Commissioner under the direction of the Director of Public Service.

The city seldom removes snow other than in the main business section, which is not large, and this is done with a grader and hand loading of trucks.

The amount and method of our snow removal does not give one very much to write about, so we probably will have to read about the other fellow and his ideas and experiences and stop at that for this time.

Success to the plan.

Truly yours,
C. R. SPENCER,
City Engineer.

▾

Westfield, N. J.

Dear Sir:

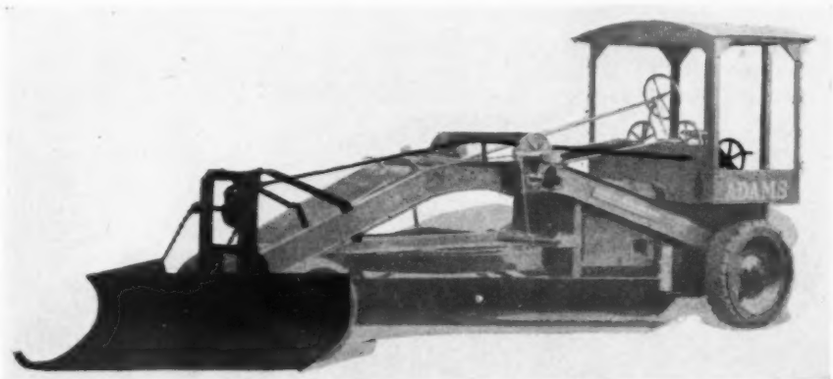
Winter maintenance is a problem which we do not encounter to a great extent in this section of New Jersey.

Yours very truly,
JOHN T. HOPKINS,
Town Engineer.

Some Snow Removal Equipment

Adams Snow Plow

The J. D. Adams Company of Indianapolis, Ind., have improved the snow plow which they manufacture for use with their motor graders. The plow is of the V-type and is controlled from the operating cab of the motor grader.



Adams Snow Plow Attached to Motor Grader

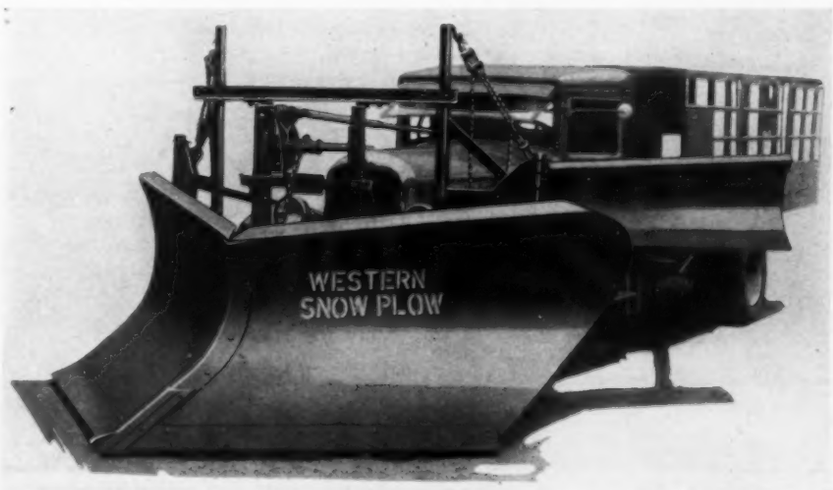
Improved Western Snow Plows for Mounting on Trucks

A substantial snow plow mounted on a truck forms a comparatively high-speed combination that is capable of covering considerable mileage in a relatively short length of time. Speed in handling snow, either as it falls or immediately thereafter, gets the best results. The snow is lighter, is not packed down hard, and is therefore capable of being moved much more easily and at a more rapid rate. If the speed and power of a truck are placed behind a rugged plow, a considerable amount of snow can be cleared rapidly, permitting long stretches of thoroughfare to be opened almost immediately.

The actual handling of Western snow plows is extremely simple, so simple in fact that any truck driver can learn to operate them in a few moments' time. Convenient adjustments, such as angle of blade, height of blade from ground, raising of blade, and various other details to suit the best working conditions, have not been overlooked. All Western plows, except those for Ford and Chevrolet trucks, are operated from the enclosed cab of the truck, without exposing the driver to the weather—a very desirable feature in view of the fact that more plowing is done during severe weather than at any other time.

Western snow plows can be attached to standard motor trucks of small, medium or large sizes; special types have been designed for use in Ford (Model AA) and Chevrolet 6 cylinder units. The table following shows the various sizes that are available to suit the needs of either the small or large community. The 10-ft. straight blade and "V" shape plows fit the same frame and may be used interchangeably, as needed; thus owners who do not have a constant use for both types, but who are likely to need first one and then the other, are relieved of the expense of purchasing a large number of plows complete with frames.

This variety of equipment provides a choice to take care of various conditions that are ordinarily encountered in snow removal work. Bulletin W-31-K, which has just been prepared, giving detailed description and illustrations, can be obtained by writing The Austin-Western Road Machinery Co., Chicago, Illinois.



Sturdy Western "V" Type Snow Plow, With Wings in Extreme Raised Working Position

Allis-Chalmers Pushes Power

Good business and good roads join hand in hand and as soon as the plows are moved just that much more quickly it will allow your community to become active.

Allis-Chalmers Track Type Tractor Equipped With Hydraulic Blade

Snow removal takes plenty of power and calls for power machinery and equipment that can push through the deepest drifts and clean up the job efficiently.

Roads are ruined by traffic moving in ruts. There is a very substantial saving result by the community when snow is removed from the entire width of the road or street. Blocked traffic completely demoralizes the life of a community if roads and streets are blocked with snow. Business is at a stand-still, doctors are delayed, fire hazard is increased, mail cannot be carried, every activity is stopped.

Unless the snow and ice are removed quickly traffic travels in ruts, and this constant wear on a restricted area of highway or street causes

serious damage. Particularly is this true at points where only one path is tracked down and one-way traffic concentrates a punishment to the surface.

Snow must be removed quickly and the sooner it is off the road the greater the saving for tax-payers, to business and the community in general. In buying a tractor and allied equipment for snow removal, be sure to get all the power your money will buy. The greater power you have, the sooner your roads will be cleared.

The Barber-Greene Snow Loader

The Barber-Greene crawler-mounted snow loader has made for itself a place on the snow-disposal systems of a great number of the larger cities in the United States and Canada. A number of Eastern transit companies and street railways also use it as part of their snow fighting equipment.

It is built for high capacity handling.

A pair of sturdy crawlers give the machine power and traction on the slipperiest surface. The feeding end of the Barber-Greene snow loader is a huge plow, designed to minimize bunching and arching of snow when handled in great quantities, which receives the snow onto a 32-in. rubber belt, mounted with cross cleats. The plow maw and the speed of the wide cleated belt have enabled the machine to make such records as clearing a city block in Madison, Wisconsin, in 15 minutes that would have taken an hour for a gang of 40 men and 10 teams. In Schenectady, New York, one of these machines loaded trucks at the rate of a 7-ton truck in 45 seconds, making it possible for only 6 trucks to do the work that

Barber-Greene Snow Loader at Work

before had tied up twenty. In Springfield, Massachusetts, a snow loader filled a 5-ton truck in 20 seconds, and in Chicago an 8 yard truck was loaded in 20 seconds.

To eliminate danger from striking manhole covers or other obstructions, the plow on the loader is built so that it may be adjusted from the operator's platform to pass over them.

The Barber-Greene snow loader discharges directly to the rear, and is equipped with baffle plates which help direct the discharge, making careful spotting of trucks unnecessary. When side discharge is required, a special Snow-trailer, a conveyor mounted on rubber-tired wheels and powered by an 8 h.p. gasoline engine is used.

In the City of Newark, New Jersey, two Barber-Greene snow loaders, working continuously 20 hours a day for ten days, dug the city out of one of the hardest snowstorms in its history with a reduction in loading costs of 57 per cent, in loading time of 66 2/3 per cent, and an actual saving of $6,508.00.

So that the machine need not remain idle in summer time, it has been designed so that the snow loader boom may be interchanged with a Barber-Greene bucket loader boom on the same chassis. The Worcester Consolidated Street Railway Company of Worcester, Massachusetts, uses this arrangement, utilizing the machine for summer maintenance work. The cities of Milwaukee, Providence, New Bedford, and Worcester are among the municipalities which get summer work out of their snow loaders.

Baker Plows Fit Varied Power

Baker snow plows for motor trucks and tractors are operated on many of the roads and streets of the nation. The plows range from those for the smallest truck to the heaviest tractors. Realizing that the user of snow plows prefers dependable well-built plows, Baker has always built plows with idea of giving good service over a long period of time. The large number of Baker plows in service after six and seven years of work justifies the wisdom of this policy.

Among the snow plows made for motor trucks are the reversible trip-blade snow plows, reversible rigid blade plows, one-way "speed" plows and four models of "V" "speed" plows. Among the above are light duty "speed" plows made especially for attachment to Ford AA, Chevrolet 1½ ton, and International 1½ ton motor trucks. Special lifting and push frames are made for several well-known trucks and two types of universal frames which will, with slight adjustments, fit the majority of motor trucks. These frames provide for pushing of the plow either from the axle or from the frame of the truck.

In tractor snow plows there are heavy reversible blade plows for

Baker V-Plow on Truck Mount

mounting on Caterpillar or Monarch tractors, both hand and power hydraulic types. Likewise, the "V" plows with wings are made for the above tractors; some with hand hydraulic lift and others with full power hydraulic lift for both wings and main plow.

In the light tractor field, Baker snow plows are made usually in both "V" and blade types for Fordson, McCormick-Deering, Allis-Chalmers, Case and others.

Calcium Chloride vs. Skidding

Soon highway departments will begin their annual battle against snow and ice. This winter maintenance of highways divides itself into two classes of work. Actual snow removal is one division. Providing traction on icy pavements is the other. By far the greatest number of winter highway accidents occur as a result of skidding. It is the purpose of this article to discuss what practical methods are used for safeguarding motorists from accidents on icy pavements.

One practice, started in Pennsylvania and now being carried out by many other states, seems the most economical and practical plan yet reported. This plan consists of placing piles of cinders, sand or gravel in stock piles close to hills, curves, railroad crossings and other danger spots where the possibilities of skidding and accidents are the greatest. These piles of sand or cinders are then saturated with a solution of calcium chloride. When the ice condition arrives workmen are sent out with shovels and the sand or cinders spread over the treacherous spots. Due to its thin coating of calcium

chloride, each particle of sand, gravel or cinders melts just enough of the ice to firmly imbed itself. This gives immediate traction, which is the main object to be secured. By melting the ice sufficiently to dig in it becomes impossible for wind or traffic to blow such sand or gravel off the road which frequently happens when untreated materials are used.

Some highway departments report that they use a ratio of 100 lb. of calcium chloride to 13 gallons of water. This makes a total of 19 gallons of solution for spraying or saturating the cinders or sand. This practice is reported to have the additional advantage of keeping the stock piles from freezing as they would do after frequent rains and snows if they were untreated.

The practice of using calcium chloride saturated cinders or sand is finding favor in cities and towns for providing traction especially at street intersections, bus stops and similar situations. Some highway engineers report using it to advantage on sections of roadway that receive very little direct sun light owing to overhanging bluffs or forest conditions. Missouri and Kansas frequently use fine gravel or chats. Some localities use coke-breeze because it is handy and cheap. Some states report that they haul direct from sand and gravel pits to the highways. Virginia reports using sand or cinders saturated with calcium chloride and spreading them with a chip spreader on the longer stretches. Hand spreading is reported in many states for the reason that the spreading can be done more evenly although in a number of instances maintenance trucks moving slowly are used in spreading.

For frozen drains and culverts and other places where there is an accumulation of ice, quick thawing results are obtained by pouring the flake calcium chloride directly on the ice. This melts the ice quickly and is a satisfactory method.

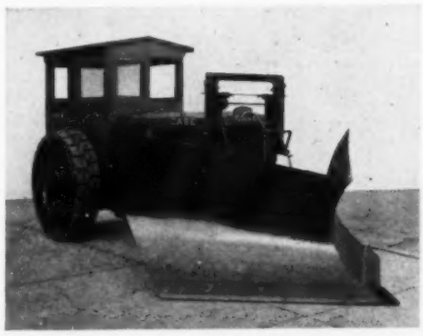
Detroit Street Sweeper and Snow Brush for New Case Model "CI" Tractor

The Detroit Street Sweeper is an attachment which can be readily mounted on the new Case Model "CI" Tractor, making a practical unit for street sweeping and snow removal work. This attachment weighs less than 700 pounds and can be mounted on the Case tractor without altering the tractor's construction.

The tractor operator controls the brush by a hand lever within convenient reach. An adjustable stop allows the broom to raise but prevents it from digging into the ground.

The standard brush is 6 ft. long, travels on an angle of 35 deg. and will sweep a space approximately 5½ ft. wide. A sprocket is located on each end so that the brush can be turned end for end, practically doubling its life.

The brush arm of seamless tubing is threaded with a right-hand thread on one end and a left-hand thread on the other. This makes it possible to adjust the tension of the chain without taking the brush out of the holder. High quality roller chain is used because it will not stretch and has a maximum pulling capacity of nine thousand pounds. The strong roller drive chain and sprocket are enclosed in a sheet metal housing which prevents rope, paper, or refuse of any kind getting in the gears underneath the chain.



Case Snow Plow Recently Developed

Speed of brush is 120 rpm. with the normal tractor engine speed of 1,100 rpm. Weight of brush crated for shipping is 780 lb.

Case "CI" Tractor With Detroit Sweeper Mounted

This brush will be particularly valuable during the winter months for removal of snow from platforms as well as from streets and sidewalks. It will swiftly and thoroughly remove snow, making a clean sweep and keeping a path clear for the tractor itself. Being driven direct from the tractor motor and working ahead in plain view of the operator, it can be maneuvered at will. Its simplicity of construction and ease of installing will appeal to anyone who has made a study of methods of keeping driveways and platforms open for traffic at all times.

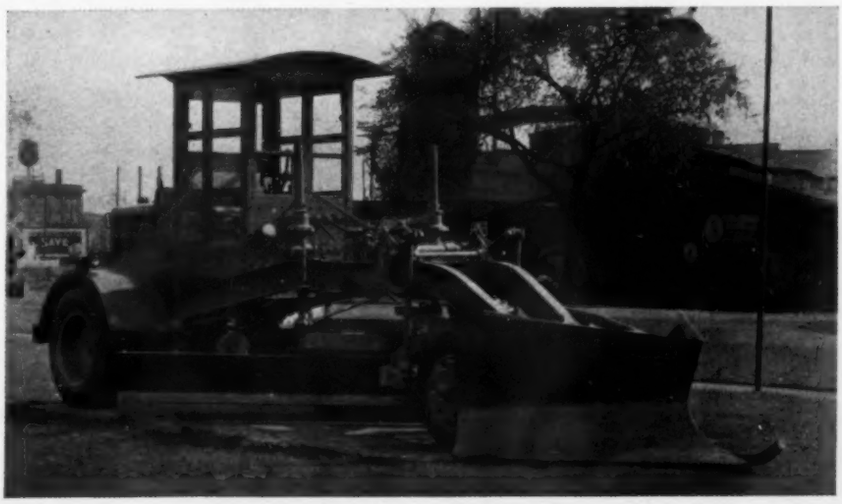
The company also makes a Case Special snow plow of the following specifications:

Width of cutting edge of plow	8 ft. 0 in.
Width of top of plow	9 ft. 6 in.
Height at front of V	3 ft. 4 in.
Height at back of V	4 ft. 4 in.
Height overall	6 ft. 0 in.
Thickness of moldboard	¼ in.
Shipping weight, approximate	1750 lb.

Further information will be gladly given on request by the J. I. Case Company, Racine, Wis.

Caterpillar Announces Auto Patrol Snow Plow

During these times many cities, etc., are faced with a reduced income and it is felt that a unit that can be used in many ways during the year will have a distinct appeal. Where a snow fighting piece of



Auto Patrol Snow Plow Developed by Caterpillar

equipment could not justifiably be purchased on account of finances—a combined snow fighting and road maintenance machine might be entirely justified.

In most large cities it is imperative that the snow be removed from the streets as soon as possible, furthermore speed is essential in some types of snow to throw the snow off to one side. The Auto Patrol snow fighting unit can cover many miles of street in twenty-four hours.

Due to the design and position of the blade the snow is moved to one side with the minimum of effort allowing the unit to move drifts of appreciable depth.

The design of the rear axle members, the absence of a differential permits the full power of the engine to be applied to the wheels. In every truck and in almost every fast wheel tractor the differential permits one wheel to slip in heavy snow, in slippery snow or on ice. Both wheels on the Auto Patrol grip the surface permitting the obtaining of maximum results. Due to the rear axle no differential construction more miles are covered per hour since no slippage of one wheel occurs.

Power control of the blade is of decided advantage in avoiding breakage of the plow, breakage of obstructions such as man holes, pedestrian safety humps, etc. Immediate raising or lowering of the blade permits a better finished job, also a maximum amount of work per hour since less time is lost raising and lowering the blade as would be the case of hand operation.

When the streets become coated with ice or frozen snow the scarifier attachment will enable this material to be cut up and here the positive traction of both rear wheels is vitally necessary.

The Auto Patrol snow fighting equipment is easily steered by the operator enabling maximum output to be obtained. Full horsepower from the engine is available for coping with the heavy snow drifts.

All parts are so designed that machine will withstand the strains of bucking the high drifts, which is a necessary part of snow fighting, also for frozen snow removal.

Dodge Truck Mounts Plow

Dodge Brothers 3-ton, 146 in. wheelbase heavy duty truck equipped for road maintenance and snow removal work forms a tool of general utility.

It has 9.00 by 20 tires all around with dual rears. The chassis has a payload allowance of 10,150 pounds with maximum laden weight of 18,979 pounds. The special body shown is a Wood W-12 three-cubic-yard dump unit with double-acting tailgate and two swinging partitions. It is operated by an F-2C Wood hydraulic hoist with controls situated in the cab.

Dodge Brothers Truck With Snow Plow and Maintenance Blade Attached

The "V" type truck plow illustrated is the "S" Frink snow plow made by the Davenport Locomotive & Manufacturing Company of Davenport, Iowa.

The scraper shown hooked under the frame is the Willet spring type scraper, manufactured by the Willet Manufacturing Company, Grand Rapids, Michigan. It is operated by an electric pump mounted under the hood, the pump in turn being boosted by double-action torsion springs which hold the blade to the road, giving, at the same time, enough flexibility to prevent breakage.

Many miles of road can be maintained per day with the scraper shown mounted on this truck.

Eagle Dump Bodies for Snow

Here is an entirely new piece of snow removal equipment; the Eagle Two-Way (dumps both to right and left sides), side-dump body made in various sizes up to 5 cu. yd.

Size for short wheel base trucks is 96 in. long by 66 in. wide, height to suit, and 120 in. long by 66 in. wide, height to suit, for longer and larger trucks. Floor and sides with steel. It is equipped with the Eagle patented two-way, side-dump power or hand hoists. The power hoist is reversible.

Eagle Two-Way Side-Dump Body

These bodies enable the user to load and unload without blocking traffic, no jockeying for position, discharges load to both right and left sides.

The power hoist has full control of the body in all positions. Power brings body back to traveling position, regardless of the angle of truck at time body was dumped.

The hand hoist raises body and load easily to any point between traveling and dumping positions, and is lowered to traveling position, either by hoist or gravity. When lowered by gravity a brake controls the body.

The simplicity of design and sturdy construction assure long, uninterrupted, satisfactory service.

These bodies will prove to be a great innovation to those users who have the courage to try them out.

They reduce handling costs.

Mounting Snow Plows on Trucks Explained by F. W. D.

The first consideration in mounting a snow plow on a truck is the manner in which the plow is attached to it. The thought in mind should be to keep the plow as close as possible to the truck. Sometimes it may be necessary to slightly alter certain parts of the plow or truck, but the time and money spent in this manner pay large dividends in operating efficiency. Mounting the plow close to the truck reduces the leverage that is produced by the combined weight of the plow and the pressure of the snow. This makes it much easier to steer the truck and hold it to the desired course. Another advantage of the compact arrangement is that the truck can be turned about and maneuvered in a much smaller space.

The weight of the plow, when in a raised position, is carried wholly or partially by the truck springs and the farther the plow is set out ahead of the truck, the more this weight is amplified. Considering that the plow may weigh anywhere from 1,000 to 5,000 pounds, it is easy to see how this weight may be a serious factor if it acts on a leverage of two or three feet. Overload or helper springs should be installed on the front springs of trucks intended for snow removal to provide capacity for the added weight of the plow.

The methods of attaching the several makes of plows varies in the

way the shock is taken up by the truck. Common practice is to hook the upper part of the plow to the front of the frame and attach push bars from the lower edge of the plow to the center of the frame. In some cases the push bars extend between the wheels, below the axle and in others they are carried outside of the wheel hubs. Precaution should be taken to provide ample clearance for the turning of the wheels to prevent their striking the push bars. On

F. W. D. With Snow King Attached Does Heavy Job

trucks of the FWD type where the front wheels are equipped with chains, this clearance is doubly important. Wheel stops should be provided in case there is any possibility of the chains catching on the push bars. Such interference of the wheels with the plow results in broken chains and places injurious strains on the driving mechanism as well as the plow.

Giving the point and cutting blades of the plow the proper pitch or setting is important and is usually controlled by the push bar on "V" type plows and on straight blade plows by a screw or worm at the blade, permitting the blade to be tilted forward or backward as desired. Most straight blade plows are equipped with a tripping device, permitting the blade to trip without injury when striking obstacles.

The blades on the "V" type plow are adjusted by shortening or lengthening the push bar. Some push bars are conveniently equipped with turnbuckles for this purpose. While on others the adjustment is made by shifting the brackets on the truck to which the rear ends of push bars are attached. Perhaps the most convenient way of adjusting the pitch of the plow is to place the truck and plow on a flat surface such as a garage floor or pavement and then adjust the push bars so the point and blades of the plow rest squarely on that surface. Be certain that the push bar brackets are securely attached to the truck or they are apt to shift under heavy going, thereby altering the pitch of the plow.

Truck Type Frink Sno-Plows

Frink Sno-Plows and levelling wings have been manufactured for the past ten years and are now being used by many state and county highway departments in the snow belt in the eastern part of the United States and Canada. Many are now in use in the North Central states. Wisconsin, Illinois and Minnesota counties also use them.

Late years have seen a considerable increase not only in the mileage of good roads, but in their importance. Millions of people, in their varied economic and social interests are dependent upon the unobstructed use of the state, county, township and municipal roads. Moreover, the vast amount of public moneys invested in the roads has brought about a realization on the part of the public that impassable roads are an extravagant expense in that the investment is "dead" during such periods.

So many miles are involved that speed is essential in order that the highway departments may keep clear all of the roads under their jurisdiction. This indicates the desirability of the high speed truck-type of snow removal equipment.

At the same time it is desirable, in the interests of economy, that the equipment used to operate the snow plows be of such a nature that it can be used for other duties when not in use for snow removal work. This is another advantage of the truck-type of plow such as the Frink Sno-Plow.

In design and construction the Frink Sno-Plow embodies many notable features, all the outgrowth of ten years of experience.

The Frink Sno-Plow is light because of the use of a panelled mould board supported by a rugged angle iron frame instead of the usual type of rolled boiler plate, re-inforced with heavy gussets. Thus, the truck is not loaded up with a great amount of dead weight and has considerably more power left for plowing snow.

The Frink Sno-Plow pushes easier because the mould board is so designed that it raises the snow higher, before carrying it to the sides of the road and thus avoids the action of the snow wedging against itself, particularly when the plow is going through deep snow.

On the bottom of each Sno-Plow are two easily replaced, inexpensive, unannealed, malleable, plow shoes which ride upon the road at all times when plowing snow except when scraping roads clean, at which time the weight is about equally distributed between the cutting edges and shoes. The entire weight may be transferred to the cutting edges if desired by means of the heel adjusting chains. The shoes act as a pivot for adjusting the height of the cutting edge so as to either clean the snow down to the road surface or leave two or three inches of snow on the road as local conditions may require.

The height of the cutting edge is easily adjusted without tools by simply hooking the heel chains at the sides of the plow in different links in the grab links attached to the sides of the lifting device.

All Frink Sno-Plows are so designed that they are wider at the tips of the mould board than they are at the cutting edge. Thus, a bevelled bank is left instead of a straight bank and no power is wasted in undercutting snow at the sides which is not actually removed by the plow.

It requires three to five hours the first time and from one-half to one hour after the first time for two men to attach the average size lifting device and push frame assembly to the truck at the beginning of the snow removal season. After the lifting device and push frame assemblies are once attached to the truck it is the work of only a few minutes to attach or detach the plow. Thus the truck can be made quickly available for other purposes if so desired.

In the Frink Sno-Plow no braces or members of the push frame go underneath the front axle or are attached to the front axle. This eliminates the chance of having these members act as sleigh shoes, when the truck gets on a frozen and rutted highway, and raise the front wheels off the road so that the driver would have no control with his steering wheel.

Another distinctive feature of Frink Sno-Plows is that the back end of the mould board is supported by chains to the upper part of the lifting device so that, as the plow enters the snow, the added weight on the plow mould board is automatically transferred to the lifting device and the front end of the truck thus ballasting the front end of the truck and preventing side slippage of the front wheels. As the truck comes out of the snow this ballast is automatically eliminated and is not

picked up again until required. The elimination of side thrust at any speed is a safety feature in addition to affording complete steering control for the driver.

Another safety feature lies in the fact that the Frink Sno-Plow does not throw snow onto the wind shield at high speed.

Several other Frink Sno-Plow features which might be mentioned here are that the plow will not wedge in a snow bank, driving power is applied directly to the cutting edge where it is most effective, and no weight is carried below the truck springs thereby eliminating damage to tires or axle from unsprung weight.

Frink Sno-Plows are manufactured for sale in the eastern states by Carl H. Frink, Mfr. Clayton, 1000 Islands, New York, and for Michigan, Indiana, Wisconsin, Illinois and all states west of the Mississippi by the Davenport Locomotive and Manufacturing Corporation of Davenport, Iowa. Frink Sno-Plows for Canada are manufactured by Frink Sno-Plows of Canada, Ltd., Toronto, Ontario.

Fundom Shovel in Snow Removal

Many kinds and classes of work can be efficiently and economically done by municipalities and counties who have a Fundom Shovel and it has proven itself to be a tool for many purposes and all seasons by its ability to remove snow from streets and highways.

It is built mostly of steel and is consequently light in weight, fast in traveling and manuvering, and possesses an abundance of power. It easily handles a ½-yd. dipper bucket without rooters and is constructed especially for removing snow and loading it into trucks or wagons.

New Fundom Shovel for Snow Removal

The speed of this outfit when handling this ½-yd. bucket or dipper gives it a larger capacity, and the full crawler mounting enables it to go almost any place and to work under almost any conditions. This snow-removal feature adds another job to the credit of this versatile shovel and makes it, more than ever, an all-purpose piece of equipment.

It is manufactured by The Fundom Hoist & Shovel Company of Lima, Ohio.

Goroco Advises Sanding Slippery Places

The highway official's duty no longer ends with the removal of snow from the highway. The slippery pavements that follow are of equal concern and equipment that removes this menace by convenient and economical means should have his consideration.

Goroco Mechanical Spreader Attached to Truck

The effect of snow removal leaves the slippery pavement condition, by far the most serious cause of accidents and one requiring speedy correction. Particular attention should be given dangerous intersections, curves and hills, where a light spread of calcium chloride, sand, cinders or similar material would practically eliminate skidding. Sudden sleet storms during the night may necessitate attention at unusual hours and the means to meet the situation must be accessible, placing the least possible dependence on labor.

The Goroco mechanical spreader fits this need. Not more than 2 men with truck and driver are required, instead of the greater number required for hand spreading, making it easy to organize the crew for quick dispatch to the areas to be protected. With the use of the Goroco, this crew can accomplish an amount of covering that would require a large labor gang, giving more uniform distribution of the small quantity required, with a consequent saving of material.

From ¼ to 2 lb. of material per square yard will suffice for the purpose and a 12,000 lb. load will cover 2,700 feet of 20 foot pavement at the maximum quantity, using the Goroco mechanical spreader.

The illustration shows the wide hopper type, accommodating full tail gate opening, mounted on rubber wheels if desired, attachable to any make truck without alteration or attachment; interchangeable between trucks in one minute and operation with as many hauling units as the length of haul requires. Quantity spread per square yard is regulated by a multiple gate in the hopper, controlled by a lever within easy reach of the operator, for whom riding steps are provided. Width spread is regulated by the speed of the propelling truck, making it possible to spread up to 30 feet in one operation. The Goroco may be used either forward or backward, as desired.

Complete catalogue may be obtained by addressing the Goroco Mechanical Spreader Co., Upper Darby Post Office, Philadelphia, Pa.

Galion E-Z Lift Motor Patrol Grader Snow Plow Attachment

The new Galion snow plow or "breaker" increases the efficiency of the grader in clearing snow from the highways. This plow opens a six foot path for the grader. The blade following widens the path and moves the snow out.

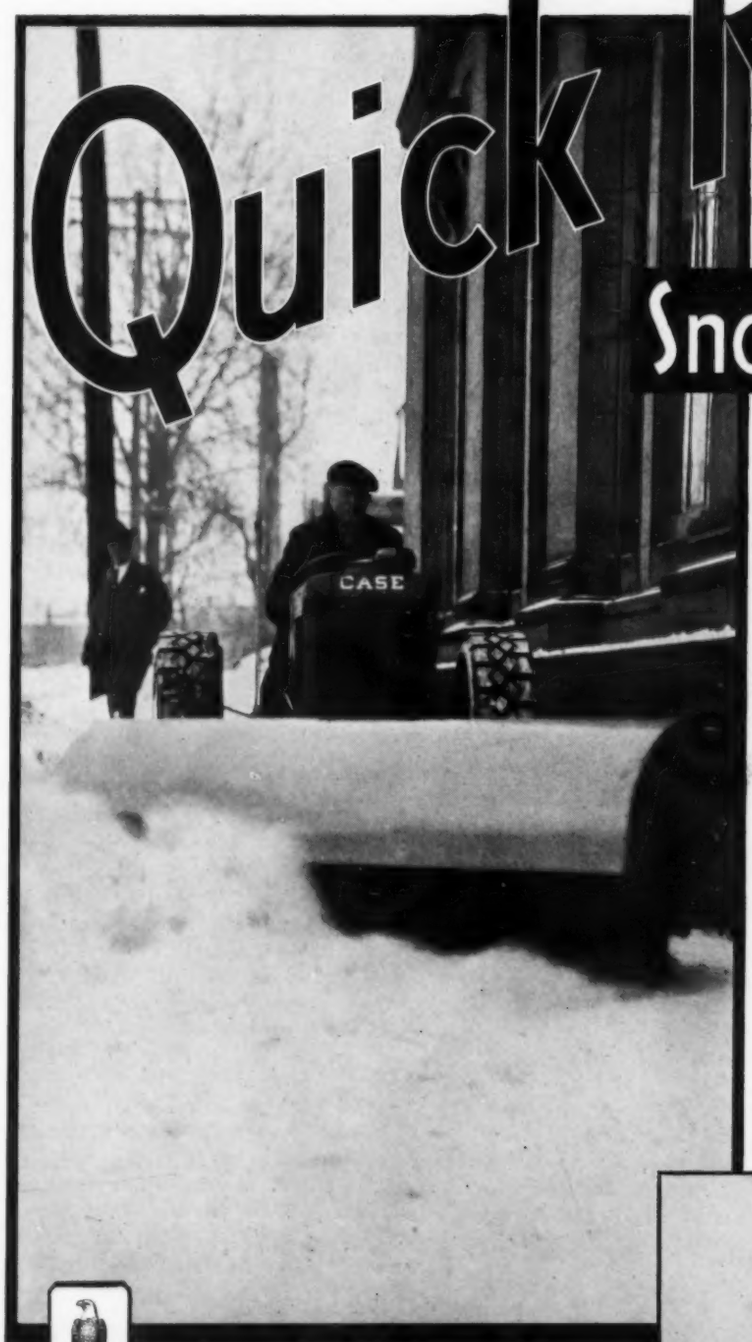
Drifts and deeper snow can thus be handled and even moderate depths are cleared more rapidly and effectively than with the blade alone.

The proper adjustments of plow and grader blade to give best results under various conditions can be readily determined by trial.

Galion blades are deeply curved and roll the snow in a furrow. While any length of blade can be used to excellent advantage with the snow plow, the use of a fourteen foot blade with a six inch addition at the top is recommended. This blade following the breaker can be set at an angle sharp enough to move snow easily and at the same time clear a wide track.

The snow plow is a V-shaped plow, properly curved and mounted to move snow. It is made of heavy steel plate and thoroughly braced. A

Quick Relief from Snow Hold-Ups

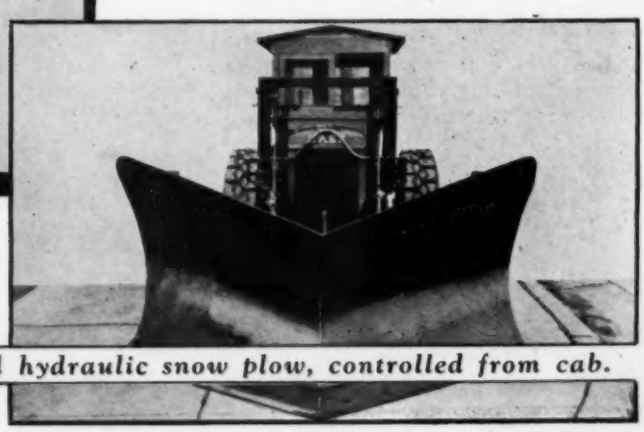


HERE'S the quickest method of clearing sidewalks, streets, parking spaces, school grounds, athletic fields, parks and skating rinks of snow.

This outfit—a new Case Model "CI" Tractor equipped with snow broom — is wading through snow, swiftly opening the way and sweeping it clean so that traffic can move as usual. It has the power to drive through and the speed and easy maneuvering that get things done.

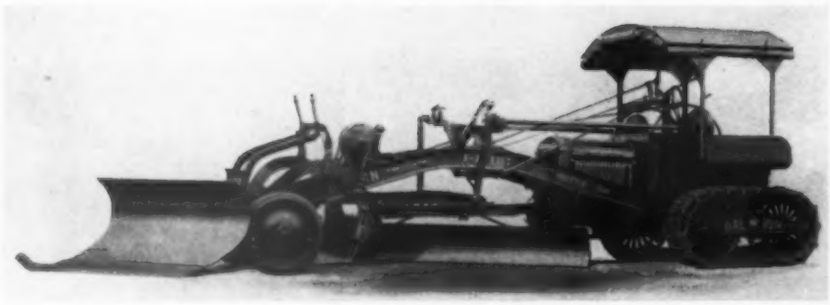
Switching to road maintenance next spring, the tractor has another big advantage because it is sealed as tight as a clam against the ravaging effects of dust and dirt. All working parts like valves, gears and bearings have this protection. More years of active and profitable use! Get all the facts about this new power.

J. I. CASE CO., *Racine, Wis.*



Case Tractor pushing V-type power-operated hydraulic snow plow, controlled from cab.

CASE



Galion E-Z Lift Motor Grader Equipped With Snow Plow

runner is placed at the front to carry the plow over obstructions and relief springs permit this action at the same time holding the plow to its work.

The plow is combined with and operated by the scarifier mechanism (with scarifier teeth removed). The weight of the scarifier block is so balanced against the weight of the plow that raising and lowering by means of the self-locking, enclosed worm gearing running in oil, is very easy.

The attachment is directly at the front of the grader frame and the power is thus carried directly to the snow plow or breaker.

The attachment of this snow plow to any Galion motor grader equipped with a modern Galion scarifier is a simple matter.

The equipment described above greatly increases the effectiveness of any Galion motor grader as a snow mover.

Unless the grader is equipped with crawlers chains should be supplied to give necessary traction on snowy roads. Both chains and special moldboard can be supplied with the plow if specified.

Handy Sandy for Winter Maintenance

Highway Service, Incorporated, will again this coming season provide equipment for winter maintenance.

Handy Sandy, used to spread sand, cinders, and calcium chloride over ice may be used to protect many of the roads and streets throughout this country. It is possible under the average snow conditions for traffic to continue, but when glare ice is present, every intersection, hill and curve is dangerous.

Handy Sandy is a trailer-type unit, mounted on rubber-tired wheels, having for the body a hopper shaped container for the material to be spread, and delivering this material out through a revolving feed drum and wire brush which extends the entire width of the bottom of the hopper. All spreading is controlled by the operator of the machine who rides on the back step. The material can be so governed to spread from a mere sprinkle up to two inches deep. The unit spreads materials from a bone-dry stage up to wringing wet. The flexible control at the delivery point also allows larger pieces of stone, frozen sand or large cinders to pass out of the machine without hindering the spreading.

White Truck With Handy Sandy Attached Ready to Spread

This organization also built a new machine for rock or stone spreading, involving the same principles as the Handy Sandy, and enters the construction field as Handy Rol-Roc. Unlike other devices for spreading of stone, it spreads to grade a perfect lay of stone, doing away with the human element dressing the stone by eye to a finished job. This eliminates the uncertainty and guess work connected with the spreading of stone, and produces far better quality at less cost.

Handy Rol-Roc is a hopper body, containing an eight or nine-foot roll, depending on the size of the unit wanted, extending the width of the unit. This roll is two feet in diameter, and the machine supported on this roll rides always on the surface of the stone spread by it, starting the keying action of the stone as a roller. Riding up on the stone does away with all objection to conditions of sub-bases, as no part of the unit comes in contact with the sub-base in spreading. The machine can also be cut to various widths of spreading, enabling the owner to build different width roads with the same unit.

Hercules Hydraulic Power Dump Bodies

Hercules Products, Inc., manufacture dump bodies which are adaptable to winter maintenance work.

All Hercules dump bodies are made of 10-gauge steel, electrically welded throughout and strongly reinforced by angles, channels and patented tie-rod construction. Ball bearings, bronze bushings, machine cut gears, case hardened parts and alloyed steels best suited for the requirements of the various parts are used. All bodies have high front ends and 22 in. tailgates insuring sure discharge of lumpy loads. Double gussets at each end facilitate the use of wood or metal sideboards to increase capacity.

Hoist operates without any jerk to the hoist or truck. The distribution of load on chassis, the forward location of lifting arms, and the hoist energy being distributed over large sub-frame eliminates excess strain on truck chassis.

Sub-frame new type enclosed at sides improving appearance and protecting mechanism. Double gussets for wood or metal sideboards. Reinforced double acting tailgate, positive locking type. Patented adjustable tie rod construction keeping body square and rigidly in place.

Independent, full length, pressed steel sub-frame, reinforcing chassis frame, carrying complete hoisting unit and body suspension brackets, absorbs all lifting strain and relieves chassis.

A single valve control at end of cylinder eliminates pump valve, exclusive to this hoist.

Heavy duty type pump and hardened ground gears and shaft are used. Extra long bronze bushings are used throughout.

The double, heavy duty, wide spread arms prevent cramping the body, facilitate handling uneven

New Hercules Hydraulic Power Dump Body, Model 3437

● GO SNOW GO TRAFFIC

"CATERPILLAR" Tractors say "go" to the snow—*and "go" to traffic!* Powerful plows smash highway drifts; street-sweeping brooms clear city roads and sidewalks. "Business as usual" rewards communities which invest in adequate snow-removal equipment. "Caterpillar" traction conquers slippery ice—"Caterpillar" power licks deep drifts —"Caterpillar" nimbleness keeps ahead of the storm.

Prices—f. o. b. Peoria, Illinois
Equipped for Snow Work

TEN	$1490
FIFTEEN	$1855
TWENTY	$2335
THIRTY	$2950
FIFTY	$4390
SIXTY	$5050

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.
Track-type Tractors Road Machinery
Combines
(There's a "Caterpillar" Dealer Near You)

loads, equalize the lifting strains and eliminate excess oil pressure.

The Hercules patented universal ball joints are trouble proof, no parts to lose off.

Mounting is simple and easy. Hoist and body are shipped completely assembled ready to mount on chassis. Apply four U bolts, hook up power take-off, connect levers and job is mounted.

Hvass Spreader for Ice Covering

The danger of accidents resulting in injury, loss of life, and property damage in winter is well known due to the following causes:

Ice on highways at curves,

Ice on highways on steep grades,

Ice on streets of municipalities causing skidding when rounding corners or attempting to apply brakes at crossings or intersections.

This danger can be eliminated by covering the ice with sand, ashes, or other materials.

The Hvass Spreader Attachment type 4-S for dump trucks will spread sand, ashes, or other materials over a swath of six to twenty feet in a uniform thickness, from the finest to the heaviest coat.

The Hvass Spreader Attachment will function equally well when truck is going forward or backward. It can be readily handled and quickly attached to any dump truck. The material flows through the full width of the truck tail gate, when the body is raised to the dumping angle, onto the spreader hopper and onto the revolving disc, and is thrown on the road surface by centrifugal force.

Hopper size is 96 in. long, 33 in. wide, 15 in. deep. Constructed of No. 12ga. sheet steel, riveted, top edge flanged, the sides are reinforced with angle iron. All sides are tapered to insure easy flow of material to orifice. Hopper securely bolted to structural steel frame which is extended at front to receive device for attaching to truck spring shackle bar.

Hvass Spreader Attachment for Protecting Ice Covered Streets

The disc is 40 in. in diameter, constructed of No. 14ga. sheet steel. Series of 1 in. angle fins riveted radially to disc. The disc hub is cast, arranged to slide vertically on upright driving shaft. Top of hub forms hood to protect upright shaft from dust which might prevent disc sliding. Lower part of hub is a clutch member for engagement with driving clutch which is out of engagement when disc is raised, closing hopper and engaged when lowered.

New Highway Trailer Developed

Highway Trailer Company, Edgerton, Wisconsin, manufacture a trailer that is adaptable to snow removal work as evidenced by the accompanying picture. The new highway drop frame side dump semi trailer would serve the purpose equally well with the four wheel trailers. It is possible to make a complete turn in a 30-ft. street with the new trailer.

Receptacles for storage of tools are furnished under rear of body.

Highway Trailers in Service in Milwaukee

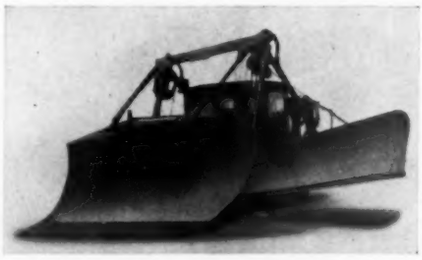
Chassis is designed for heavy duty, free from mechanical and delicate parts. Body is electric welded and riveted and is water tight throughout. Trailer can be detached from truck in a fraction of a minute. They can be furnished in 3, 3½, 4, 4½, 5 and 6 cu. yd. water level bodies.

LaPlant-Choate Snow Plows

The LaPlant-Choate Manufacturing Company has made many new improvements on their hydraulic-operated snow plows among which are a newly improved moldboard and a more simplified hydraulic control arrangement.

The LaPlant-Choate "V" type hydraulic-operated snow plow is manufactured for use on Caterpillar 15-20-30 and 60 tractors. The hydraulic control levers are placed within the cab so that the tractor operator can raise or lower either wing, or the V-nose, by merely pushing a lever convenient to his seat. All LaPlant-Choate snow plows are mounted on the center pivot mounting which throws the weight on the center of the tractor track, thus assuring maximum traction even in the heaviest drifts.

The LaPlant-Choate snow plow is easy to mount and dismount from the Caterpillar tractor. Actual timing has shown that one can be disconnected from the tractor in twenty-one minutes by two men. Surely this feature is valuable in that it leaves the tractor free for other uses at all times.



New LaPlant-Choate Hydraulic Snow Plow

Speed, so essential in snow removal, can be obtained only where equipment is absolutely modern. LaPlant-Choate hydraulic snow plows are equipped with hydraulic controls for both the side wings and V-nose, allowing the operator to raise or lower any of them instantly. The controls are conveniently located within the tractor cab.

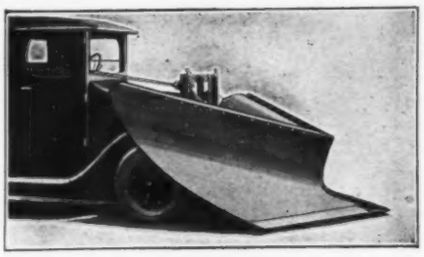
The LaPlant-Choate snow plows are ruggedly constructed of heavy battleship steel plate, securely riveted and electrically welded together.

All parts of the plow are strongly reinforced to give them the strength needed to buck the deepest drifts. Scientifically designed so that the pressure against the steel moldboards is carried directly to the center pivot mounting on the tractor, there is no danger of delays due to flimsy construction.

The Linn-Frink Sno-Plow

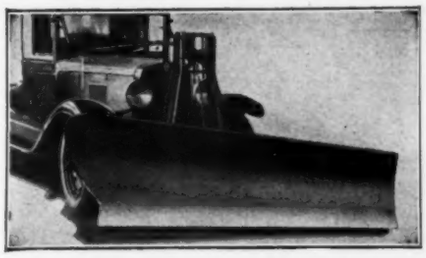
The Linn-Frink Sno-Plow is the culmination of years of experience with the problem of snow fighting. The Linn-Frink Sno-Plow is furnished complete with two 14-foot leveling wings, plow lifting device, wing hoist assembly and all braces and bolts, ready for attaching to the tractor without drilling holes or the use of special tools. After once attached the Sno-Plow may be removed in a few minutes by unhooking the nose chain, the two heel adjusting chains and pulling out the two drive bar pins. This leaves the tractor with only the lifting device and leveling wings attached, ready to be used for other purposes.

Ease of steering and absence of side thrust are obtained in the Linn-



"V" Speed Truck Plow

You can select from over forty models of Baker Snow Plows for motor trucks (1½ ton up) as well as for leading light and heavy tractors.



One-Way Speed Truck Plow

BAKER SNOW PLOWS

For Motor Trucks and Tractors

"V" Plow with Wings for Heavy Tractors

Those who have applied the test, stick to Baker Snow Plows. The host of users expressing 100 per cent satisfaction extends from coast to coast. There is no secret—simply making the best possible snow plows for your truck or tractor. Play safe by putting on "Bakers" this winter.

State name and model of truck or tractor in requesting Snow Plow catalogs.

The Baker Manufacturing Company
506 Stanford Ave., Springfield, Ill.

"FIRST"

SAFETY—SPEED—DURABILITY—LIGHT WEIGHT

Gettelman Safety V Plow for 3 to 7-ton trucks with SPEED and POWER.

Plow rides over obstructions due to patented 4 point push frame construction and counter-balance springs which take the shock off the truck and plow.

FRED GETTELMAN CO.

Manufacturers of Blade and V Type Plows for 1½ to 7-ton Trucks.

4400 WEST STATE STREET MILWAUKEE, WIS.

Frink Sno-Plow by proper design of the cutting edge and moldboard, the cutting edge being given a slight shear, just enough to keep the snow moving on the front of the moldboard at all times, yet not enough

Side View of Linn Tractor With Linn-Frink Sno-Plow Attached

to produce the side thrust found in all wedge shaped plows. Even hard crusted snow is readily lifted and broken up before being carried to the sides by the plow moldboards. It is then picked up by the leveling wings and carried to the sides, leaving a cleared space from 14 to 22 feet wide, according to the adjustment of the wings.

The entire plow is quickly and easily raised for traveling from one job to another, by the Frink worm gear lifting device, easily operated by a hand wheel located immediately back of the cab. This lifting device is attached to the front of the tractor by substituting four longer bolts furnished with the Sno-Plow and is rigidly braced to the top of the leveling wing hangers.

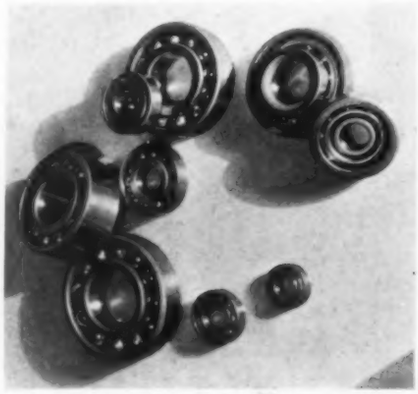
Link-Belt Loader for Snow Removal

When drifts are pushed back along curbs of city streets they must be removed. In the accompanying picture a Link-Belt Grizzly crawler loader is shown loading trucks on Parkway between 16th St. and 17th St. in Philadelphia, Pa. Using one man to operate the loader and two men cleaning up, this machine loads a 5-ton truck in a little over a minute.

Loading Trucks With Link-Belt Loader

New Departures Make Machines Winter-Worthy

Just as humans must prepare themselves for the rigors of winter, so precautions must be taken in the design of machines which are to operate in colder climates. Those who have seen modern snow-removing equipment in action, know that strides have been taken in the right direction. Whole cities are unbandaged almost overnight. How have these machines been made so winter-worthy? Anti-friction bearings have helped a lot. Many of them utilize New Departure ball bearings and here is why; they need less oil, less often. Friction in a New Departure is so slight that it is hard to measure. So slight that a negligible amount of lubricant prevents damage to the bearing in service. The deep race-grooves entrap a certain amount of oil and the bearing is instantly lubricated. Even if the main oil supply is cold, sluggish and slow to flow, the bearing is safe, at least for some little time. In many applications New Departures perform just as well with grease lubrication. Oftentimes the size of a machine does not measure up to the size of a blizzard, in which case power is at a premium. Then the value of New Departures is again apparent, for the true rolling motion inherent in these bearings prevents power waste and sluggishness.



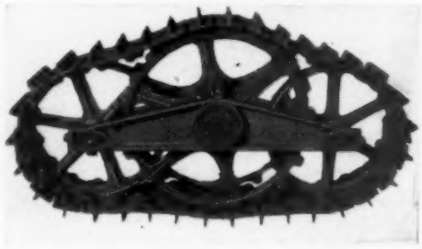
New Departure Ball Bearings for Snow Removal Equipment

Peerless Tracks Grip Snow

Peerless tracks have been developed to replace the wheels on the Fordson tractor to meet the demand for a tractor in the low price field having the tremendous pulling power and the many other desirable features of the crawling type machine at a saving in price.

Peerless tracks installed on the Fordson tractor insure positive traction. The Peerless equipped Fordson is efficient on soft ground, gravel, sand and snow.

Peerless tracks are very easily attached to the Fordson tractor with the use of ordinary tools and without the necessity of drilling any special holes or in any way altering the Fordson tractor excepting to remove its wheels. The original Fordson wheel retainers are used.



Peerless Tracks for Tractors

Each rear wheel on the Fordson tractor is replaced by a Peerless track unit which is a double sprocket and frame with an idler wheel at either end. The track is driven around these wheels by the double sprocket. Both top and bottom of the double sprockets are in mesh with the track with no less than twelve teeth on each side engaged at the same time. The track itself is composed of thirty-four sections or shoes, cast of special alloy steel to resist wear and are pinned together with two strong pins. The shoes are interchangeable and the track may be used either on the left or right side and can be changed from side to side as the wear demands. The sprockets, frame and idler are cast of the same tough, wear-resisting steel.

The idler wheels are carried on Timken roller bearings properly protected from dust and dirt and are lubricated by means of dust proof pressure grease cups. All wheel bearings are carried sufficiently high from the ground to make the grinding in of dust and dirt impossible. The idler wheels are adjustable so that the tracks may be easily tightened whenever necessary. The units on either side oscillate individually.

The sprocket wheels are somewhat smaller in diameter than the standard wheels which they replace. This lowers the gear ratio and greatly reduces the engine strain which results in longer life and much greater power and fuel economy. The same tractor speed is maintained, due to the entire absence of slippage.

Special shoes with detachable cleats can be furnished.

Root Develops Interchangeable Snow Plows

All mechanical parts of the plow are mounted on the motor truck before the arrival of snow. This does not in any way interfere with the operation of truck for any hauling service. With the arrival of snow, motor truck is driven to place back of blade plow, the release valve in cab of truck is opened allowing the plow frame to drop engaging two large dowel pins on bottom of plow. This brings in line the holes at the top of plow. Two large screws are tightened in place and you are ready to plow snow. This operation will not require more than ten minutes.

Root extension wings have cab control. Either wing is raised or lowered by driver instantly. Either extension wing is extended or folded instantly in the same manner.

Root Interchangable Snow Plows

A two wing plow will clear road to a width of 16 ft. Owing to the different depths of snow found along any highway, the most important feature of wings is control. If it is necessary to stop truck to set a wing in any desired position, the efficiency of the wing is largely lost as too much time is required to make the adjustment. A motor truck travels at a rapid speed and conditions vary every few rods. Proper adjustment cannot be made unless cab control is available.

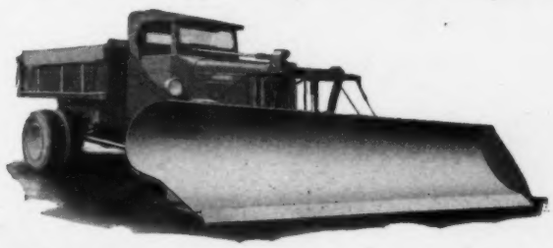
DAVENPORT LOCO. AND MFG. CORPORATION, DAVENPORT, IOWA
Licensed Manuf'r for Wisc., Mich., Ill., Ind. and states west of the Miss. River

News!

The editorial columns provide you with new methods and practices in use by others in your field.

But the advertisements are no less important for they keep you informed of advances in equipment and machinery that mean savings in construction costs.

READ THE ADVERTISEMENTS!



Clears any road
Fits any truck

Heavy snowfall does not penalize the community where Ross Moldboard Snow Plows are in use. Strong — durable — powerful — they have a performance record of more snow under various conditions with less power, due to its properly shaped moldboard whereby it is rolling a live load rather than shoving a dead one. Side draft is eliminated as the pressure is properly balanced with the truck. No top heavy rims nor shoulders left to roll back into the cleaned path as the snow is thrown clear and spread off the shoulders.

Let us send you our latest illustrated literature. Write us today.

THE BURCH CORPORATION
CRESTLINE, OHIO

BIG RED SNOW FENCE
ILLINOIS WIRE & MANUFACTURING CO.
JOLIET, ILL.

BIG RED construction guarantees longer life and service. Pickets of best wood, decay-proofed and pointed. Can't come loose. Wire specially galvanized, no cracking, rust proof. Three out of every four miles of snow fence are "Big Red." Buy the best.
Write for further information and descriptive circular.

Shunk Adds Meyer Auto Snow Plow

Meyer Auto snow plow can be attached to any automobile, tractor or light truck, with I-beam axle, in two to four minutes by a new type of connection. This connection acts as a hinge, giving the necessary flexibility to permit plow to travel up or down grades. At the same time it acts in the nature of a trip so that the plow rides over all ordinary obstacles.

Since the only effort required to clear the road is driving the automobile, you sit inside your car where it is warm and comfortable.

A feature of the Meyer Auto snow plow is the blades. Instead of ordinary strips of metal which wear and dull easily, the blades on this plow are made of high carbon steel, the same as used in regular road grader blades, giving greatest strength at the point where most wear occurs and permitting a cleaner cut as well as a closer cut to the ground.

These blades and the steel nose of the plow are all electric welded into one-piece construction with the result that both sides and the front act in unison.

The weight of the plow rides on a steel runner. There is virtually no weight for your automobile to carry.

The plow is 81 inches wide at its widest point which means that it clears a road well beyond the width of the car wheels.

Trackson Crawlers Employed

A very effective and economical combination is the Trackson McCormick-Deering crawler tractor and Wehr grader, shown in the illustration. The versatility of this equipment is an important factor, for it has power to handle the heavy snowfalls and speed for the light ones. The Trackson crawlers provide sure footing and plenty of traction for work in soft, loose snow or on icy grades. For scarifying ice the teeth are reversed so that the scarifier will stay on the ground.

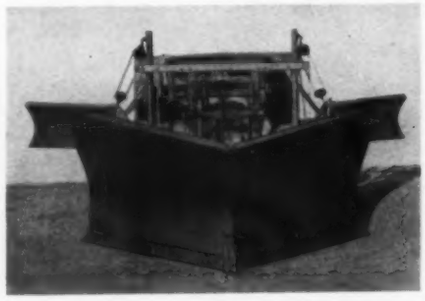
Trackson-Wehr Grader Cleaning Street

The cost of snow removal with Trackson crawler tractors is low, for they are economical in consumption of fuel and oil and require little attention. What few repairs or adjustments may be necessary from time to time are simple and easily made. Another important advantage of Tracksons is their year-round usefulness. When the last snow has melted in the spring and the slush and ice have been removed from the highways, the crawler tractors can be used with various types of graders, scrapers, shovels, etc., and for general utility purposes.

Western Wheel Scraper Develops New Plows

The Western line of snow plows has been developed to permit the economical and efficient use for winter road maintenance of whatever motor trucks may be owned or which can be hired for the purpose.

To this line a wing attachment has been added during the present year for use on the "V" shape plow, with 3½-ton or heavier trucks. The wings are steel blades pivotally fastened to the back of the plow on either side and extended for the purpose of widening the cut. They are adjustable vertically and horizontally so that they can be used for pushing back the snow at the top of the drift or for widening the cut throughout the entire depth of the snow. They can be removed easily when not needed. The outstanding feature of these wings is that they require no attachment whatever on the truck, fastening to the plow only.



Western Truck Plow Recently Improved

The Western snow plows are manufactured by Western Wheeled Scraper Company, Aurora, Illinois, and are sold by The Austin-Western Road Machinery Company, Chicago, which has branch offices in all principal cities.

Willett Would Work Trucks

The Willett Manufacturing Company of Grand Rapids, Michigan, have a method of transforming a street flusher or any truck into a snow scraping unit, whereby one may use a truck twelve months in the year.

Water Wagon Does Double Duty With Willett Scraper

Simply mount the Willett Spring-Scraper under the frame of the truck by "J" bolt clamps and a hydraulic operated machine for the efficient scraping of snow and ice from the streets results. It is able to go over the street car tracks and manholes at a speed of from ten to twenty miles per hour.

The Willett Spring-Scraper is manufactured in sizes to fit any make of truck and can be quickly attached without mutilating the truck in any way.

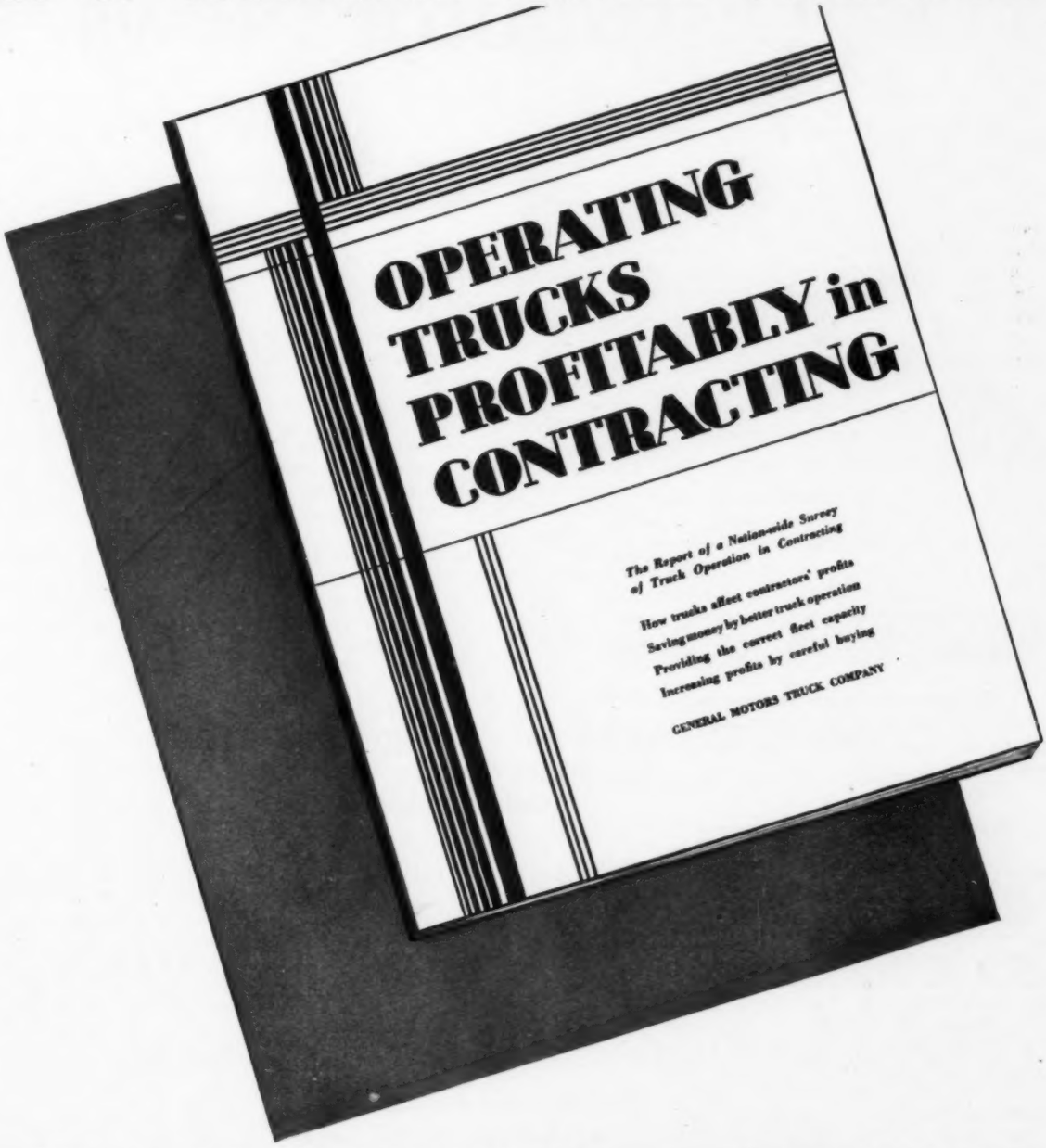
Complete information regarding this machine can be had by writing the Willett Manufacturing Company, Grand Rapids, Michigan.

New Wisconsin Special Snow Plow

The new Wisconsin plow, built for any 10-ton tractor, with or without wings, has been thoroughly tested under the severest possible conditions. The overhead lifting device is actuated by hydraulic means. A shoe-and-roller construction carries the weight of the plow over bare spots on the road. The side wings may be used in either a lowered or raised position.

New Wisconsin Special Attached to a Bates 40 Crawler Tractor

BUILDERS OF COMMERCIAL VEHICLES EXCLUSIVELY


OPERATING TRUCKS PROFITABLY in CONTRACTING
The Report of a Nation-wide Survey of Truck Operation in Contracting
How trucks affect contractors' profits
Saving money by better truck operation
Providing the correct fleet capacity
Increasing profits by careful buying
GENERAL MOTORS TRUCK COMPANY

● The General Motors Truck Company recently completed a two-year study of Contractors' truck operations in all sections of the country. Not only did they learn how to make trucks that would be of greatest value to you, they also found out which types and sizes of trucks are most economical in each class of service. Their reports include a wealth of facts and figures that will help you make a sound selection of truck *types*. Mail the coupon for a free copy of this report, or call in the General Motors Truck representative in your locality, and let him show you how an analysis of your particular needs, guided by the information presented in this report, can be applied for greater profits in your truck operations. Time payments financed at lowest available rates through our own Y. M. A. C.

GENERAL MOTORS TRUCK COMPANY, PONTIAC, MICHIGAN
A Subsidiary of Yellow Truck and Coach Mfg. Co.

GENERAL MOTORS TRUCKS

AND TRUCK-BUILT TRAILERS

General Motors Truck Company
Pontiac, Michigan

I am interested in learning how I can cut my trucking costs. Send me "Operating Trucks Profitably in Contracting." I understand that this request places me under no obligation whatever.

Name_____ Firm_____

Street_____ City and State_____

Distributor News

Texaco Adds Calcium Chloride to Its Road Products

Texaco calcium chloride is now added to the line of asphaltic street and highway products marketed by the Asphalt Sales Department of The Texas Co. The road building industry will be the principal market for Texaco calcium chloride. The material acts as an efficient dust-layer on gravel, macadam and similar surfaces, and is recommended for use in the curing of concrete.

For concrete curing, the calcium chloride may be applied on the surface in flake form, or, dissolved in water, it may be added during the mixing of the concrete. This material may also be used in the manufacture of concrete blocks, causing them to set rapidly, and it provides a low-freezing brine for refrigeration purposes.

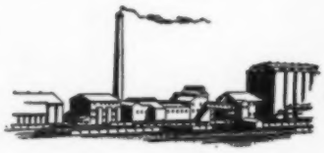
Texaco calcium chloride is one of several salt products put out by the new plant of The Texaco Salt Products Co. at Tulsa, Okla. The sale of the calcium chloride product will be handled through The Texas Co., Asphalt Sales Department, 135 East 42nd St., New York City, which has branch offices throughout the country.

Ames-Baldwin-Wyoming Shovel Co. Formed

The formation of the Ames-Baldwin-Wyoming Shovel Co. has been announced. The new company brings together under one management the shovel manufacturing properties of such well known makers as Ames Shovel & Tool Co., Baldwin Tool Works, Hubbard & Co., Pittsburgh Shovel Co., and The Wyoming Shovel Works, operating plants in Alton, Ill., Anderson, Ind., Montpelier, Ind., North Easton, Mass., Parkersburg, W. Va., Pittsburgh Penn., and Wyoming, Penn. Relationships between the several companies and their customers will not be affected by the new organization. Rather its policy will aim greater usefulness in service and contact.

E. R. Dougherty Joins Amsco Organization

E. R. Dougherty has joined the Amsco Sales organization, and will work with Mr. E. F. Mitchell, District Manager, in the engineering and sale of Fahralloy castings in Chicago and the surrounding territory. Mr. Dougherty has had a substantial experience in this work, and is familiar with problems of the application of castings for high-temperature and corrosion services, and their solution. The Chicago Sales representatives may be reached at 1414 McCormick Building, telephone Harrison 0910.



Young Radiator Co. Reports Increased Activity

The Young Radiator Co. of Racine, Wis., manufacturers of radiators, for internal combustion engines, diesel engines, pumps, compressors, power units, trucks, and unit heaters, convectors, car heaters, report much increased activity during the past three months, and during September and October have been working day and night shifts in their sheet metal, stamping and assembly departments. It is reported much of this activity is developed from a new line of car heaters, convectors and cabinet and wall radiation for homes, offices, buildings, etc., and a new design of unit heater much improved over the product which the company has previously made.

Littleford Announces Opening of Chicago Office and Warehouse

Littleford Bros., Cincinnati, O., manufacturers of road maintenance equipment, have opened a Chicago office. Herbert M. Orschel, formerly with the Mohawk Asphalt Heater Co. and the Aeroil Burner Co., is in charge. Mr. Orschel has had long experience and a thorough knowledge of the road maintenance and contracting fields. The new address is Littleford Bros., H. M. Orschel, district manager, 217 E. Illinois St., Chicago.

Ralph Leavenworth Appointed Advertising Manager

Ralph Leavenworth has been appointed general advertising manager of the Westinghouse Electric and Manufacturing Co., according to an announcement made by J. S. Tritle, vice-president and general manager. He will have charge of all advertising and publicity activities of the company, including the advertising division of the merchandising department, now centered in Mansfield, O.

The business career of Mr. Leavenworth, prior to his association with the Westinghouse company, has been one in which sales and advertising administrative work have been closely paralleled.

Graduating from Hamilton College, Clinton, N. Y., in 1914, he became associated with the Y. M. C. A., with headquarters in Cleveland and remained with that organization four years. After the war he joined the Standard Parts Company, also located in Cleveland, and except for a short period, during which he served as personnel director for a publishing firm, he was advertising manager of this concern, until 1923. In that year he became an account executive for Paul Teas, Inc., an industrial advertising agency. He remained with this firm six years, becoming in that time part owner of the company.

Jan. 1, 1930, he joined the Austin company, of Cleveland, one of the world's largest engineering and building organizations, as assistant general sales manager. In this work he served in an executive capacity on sales, administrative and advertising work concerned with this international organization.

His appointment as general advertising manager of the Westinghouse company followed. He will have his office in the East Pittsburgh headquarters of the company.

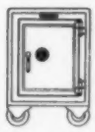
Chicago Pneumatic Tool Co. Forms Service Club

The CP Quarter Century Association was formed Oct. 1, 1931, to include all present employees of Chicago Pneumatic Tool Co. and its affiliates in its several manufacturing plants and numerous offices throughout the world, who have completed 25 years or more of uninterrupted service. Seventy-five were eligible at that time and their total years of service numbered 2,112. A suitably engraved Certificate of Memberchip and a specially designed solid gold pin was presented to each member. The active male employee with the longest term of service in the United States is Mr. Louis H. Brueggemann, now employed at the Detroit, Mich., plant and whose service dates from April, 1898. In foreign countries, the active male employee having the longest term of service is Mr. Horace P. Marshall, present manager of Leeds, England, office whose service dates from April, 1896. The active woman employee in the United States having the longest term of service is Miss Florence Aldcorn of the New York sales office, whose service dates from March, 1900. In foreign countries, the active woman employee having the longest term of service is Miss David of the Cardiff, Wales office, whose service dates from September, 1905. As others become eligible, they will be enrolled in the association and presented with the Membership Certificate and pin.

Announcement

The Chicago office of the American Manganese Steel Co. has been moved from 333 N. Michigan Ave. to room 1414 McCormick Bldg., 332 S. Michigan Ave., where they are located with their parent company, American Brake Shoe & Foundry Co. Sales representatives Mr. E. F. Mitchell and Mr. E. R. Rougherty are available there.

Like Keeping *Your Tools...* *in a* SAFE!



ROAD Maintenance Men, Contractors—we present the HanDeeBox, a tool box made to stand the terrific abuse given equipment in highway service.

It is of All-Steel Construction—much stronger than a wooden box, but lighter in weight. Keeping tools in this box is like putting them in a SAFE!

You can trail the HanDeeBox 40 or 45 miles an hour! It is equipped with semi-elliptical springs, Timken roller bearings and pneumatic tires.

Let us tell you all about the HanDeeBox. Write for bulletin G-6, now, before you have a chance to forget. You won't be obligated to us. We want you to get particulars about this unique box.

THE SIGN OF A GOOD HEATER
LB
LITTLEFORD BROS. CINCINNATI, OHIO

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LITTLEFORD

Road Maintenance Equipment

SINCE 1900

LITTLEFORD BROS. 454 E. PEARL ST. CINCINNATI, O.

You can't dig with a Blueprint or a promise---

Buy a WILLIAMS Bucket and get *proven and guaranteed ability*

YOU buy the new WILLIAMS "Champion" Bucket strictly on its merits— it is *definitely guaranteed* to show greater speed due to unequalled digging power.

This bucket is a real champion—it welcomes competition, and invites comparison. Write for Bulletin "RS."

G. H. WILLIAMS COMPANY
617 Haybarger Lane, Erie, Pa.
Branch Offices: *New York, Pittsburgh, Cleveland, Chicago*

WILLIAMS
BUCKETS—TRAILERS

312

Service Exchange

for Manufacturers or Distributors

Editor's Note.—From time to time we receive letters from distributors wishing to be put in touch with manufacturers of certain lines of equipment, or from manufacturers seeking representatives of their products. Items of this kind will be published and names and addresses furnished interested persons upon request.

New Lines Wanted

Distributor covering northern Illinois and southern Wisconsin desires additional lines, especially compressors, form graders and proportioning scales for mixers.

University man, now selling foundry and sheet metal field in Northwest, desires additional accounts on commission basis only. Will travel to factory at own expense and spend necessary time to familiarize himself with line.

Newly organized distributing company located in Boston, desires to secure a few road machinery accounts for New England territory.

Distributing organization located in Tennessee desires to handle a complete line of road building equipment.

Manufacturers' representative, clientele, state of New Jersey. Can represent manufacturers or contractors machinery, accessories, materials for general contractors and stone crushers. Large or small units.

Man experienced in building construction field desires position with construction or engineering firm. Familiar with credit and estimating—also has had some selling experience. Permanent position is desired and location is immaterial.

Civil Engineer, located in California, desires to represent manufacturers of equipment and supplies. Is widely acquainted in western states and can furnish engineering and financial references.

Wanted, line of picks, sledges and crow bars, spades, shovels and similar implements by New Jersey broker, with warehouse facilities, contacting New York and New Jersey jobbers.

Warehouse facilities for serving Pittsburgh territory. Would like to secure line of portable and stationary conveyors.

Distributor covering Wisconsin and Illinois territory wishes to add to present lines. Thoroughly familiar with bituminous materials and equipment for handling.

Distributor situated in Portland, Oregon, desires line of stationary diesel engines, from 75 to 150 hp., to serve western trade for driving rock crushers and industrial plants.

Representation in New York City wanted by construction and industrial equipment by newly organized firm whose personnel has wide experience selling contractors and engineering and industrial concerns in this area. References and qualifications gladly given.

Sales engineer, experienced in earth-moving machinery, desires connection on salary or salary and commission basis. Wide acquaintance with machinery dealers, oil and gas industry, pipeline contractors and material men. References.

Manufacturer's representative situated in New York City, now handling pumping machinery, would like to take on two or three additional lines serving the same field as his present account.

Distributor situated in Virginia wishes to make connection to represent manufacturer of manganese crushing plates and jaw rock crushers.

Services of experienced engineer available. Formerly connected with state highway department, and well known manufacturers. Will consider proposition from manufacturer or distributor of highway construction equipment.

Distributor of building specialties covering territory within 100 mile radius from Chicago is equipped to represent additional lines.

▼

Representatives Wanted

Manufacturer of vapor spray cleaning device used by contractors for cleaning construction equipment and also for removal of dirt, grease, etc., from the surface of stone and brick structures, wishes to secure sales agents in the larger cities.

Local dealer or salesman wanted—who is personally acquainted with his city or town officials. Can earn liberal commissions selling street signs. Used in over 350 leading cities.

Textile manufacturer wishes sales representative to handle complete line of tarpaulins. Distributors, now handling road building equipment and other contractors' supplies, especially desired.

Manufacturer of crushing and screening plants wants a representative in Manila, Philippine Islands.

Manufacturer of grader wants dealers in west and east central states.

Manufacturer of a new tractor dump wagon has a number of desirable territories open. Full cooperation extended to distributors.

Manufacturers of ditching and trenching machines, to facilitate the laying of pipe lines has liberal proposition to offer dealers.

Manufacturer of metal traffic lane markers for pavements, has a number of desirable territories open. Write for their proposition.

Manufacturer of a new crawler dump wagon desires distributors in the Middle West territory.

Manufacturer of complete line street repair equipment, tar kettles, heaters, patching plants, torches, etc., has open territory in southeastern states and desires active distribution. Territory largely open from Virginia to gulf states, inclusive, also state of Oklahoma.

Manufacturer of a high-grade truck snow plow desires distributors in the Middle West territory.

Manufacturer wants distributors for complete line of roller bearing wheel horse and tractor drawn maintenance graders, soft road bridging, and pressed steel snow fence.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of Roads and Streets, published monthly at Chicago, Illinois, for October 1, 1931.

State of Illinois, } ss.
County of Cook, }

Before me, a Notary Public, in and for the state and county aforesaid, personally appeared E. S. Gillette, who, having been duly sworn according to law, deposes and says that he is the business manager of the Roads and Streets and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 411, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Gillette Publishing Company, 400 W. Madison St., Chicago, Ill.; Editor, H. P. Gillette, 400 W. Madison St., Chicago, Ill.; Managing Editor, C. T. Murray, 400 W. Madison St., Chicago, Ill.; Business Manager, E. S. Gillette, 400 W. Madison St., Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Gillette Publishing Company, 400 W. Madison St., Chicago, Ill.; H. P. Gillette, 400 W. Madison St., Chicago, Ill.; E. S. Gillette, 400 W. Madison St., Chicago, Ill.; Mrs. R. W. Hume, 303 S. Stone Ave., LaGrange, Ill.; Winifred Gillette, 1125 Oak Grove Ave., San Marino, Calif.: Commonwealth Title Insurance & Trust Co., Chestnut and 12th Sts., Philadelphia, Pa.; Louise Forsythe, 13 E. Windermere Terrace, Lansdowne, Pa.; LaVerne Louer Hellyer, Ambassador Hotel, Chicago, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is..... (This information is required from daily publications only.)

E. S. Gillette, *Business Manager.*

Sworn to and subscriped before me this 29th day of September, 1931.

Kittie C. Woulfe, *Notary Public.*

(My commission expires Feb. 8th, 1934.)